Professionals in Chemistry

1981-1982

A Digest of Information about
The Chemical Profession

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PROFESSIONALS IN CHEMISTRY: 1981 - 1982

A Digest of Information about
The Chemical Profession

Office of Manpower Studies
American Chemical Society
1155 Sixteenth St., N.W.
Washington, D.C. 20036
March, 1983

Available from the Distribution Office, ACS.
Price: $ 22

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Professionals in Chemistry 1981-1982, the seventh edition of Professionals in Chemistry, continues the series of statistical handbooks of the chemical profession. The four chapters, which are devoted to Education, Earnings, Employment, and R&D, each begin with charts that graphically analyze sequences of historical observations on the subject of the chapter. And one chapter also contains two short pieces that examine certain data from the statistician's point of view. The bulk of this report, however, is the 63 statistical tables.

Chapter I on education begins with a series of charts that trace the history of numbers of graduates in chemistry, chemical engineering, and biochemistry as a fraction of the population of young men and of young women. This chapter also contains a series of seven tables that recount numbers of degrees awarded in chemistry and related fields. A feature of the chapter on education is a series of tables that show the results of research on the quality of graduate programs in chemistry, chemical engineering, and biochemistry. Although the Office of Manpower Studies shares the researchers' concerns that such rankings of university departments are subject to abuse, the lists appear here because they do present results of conscientious research that will be useful to readers. This report follows the original report in avoiding any combination of the separate scores to produce an overall ranking among university departments.

Chapter II, which reports earnings, departs from the pattern of the other chapters in that it contains two sections of text in addition to the charts and tables. One of these sections presents formulas that summarize the relationship between salary and various personal characteristics. The other textual item explains a method for avoiding a common error in interpreting the difference between women's and men's average salaries. In addition to reporting chemists' salaries, this chapter also includes tables that compare chemists' salaries with those of other professions. In general, the message here is that although chemists' salaries have not kept pace with prices in recent years, chemists really have not suffered more than their colleagues in related professions. One table in the chapter on earnings combines information about chemists' salaries with information about the cost of living in various U.S. cities to arrive at a comparative measure of how well chemists live in different parts of the country.

Chapter III, on employment, outlines the labor force status of chemists and features a comparison in the outlook for growth in employment among various fields within science and engineering.

The final chapter, on expenditures for R&D lacks data on the very recent history of military R&D as a fraction of all chemical R&D. Although military studies are almost certainly increasing as a fraction of chemical R&D, the actual data for 1981 and 1982 are not yet available.

The ACS Office of Manpower Studies prepared this report. Bob Jones directed the project. Sandy Schowgurow did much of the library research. Harry Foxwell made the predictions of the numbers of graduates, wrote the two analytical pieces in Chapter II, and prepared the charts.

Robert K. Neuman
Head, Department of Professional
Relations and Manpower Studies

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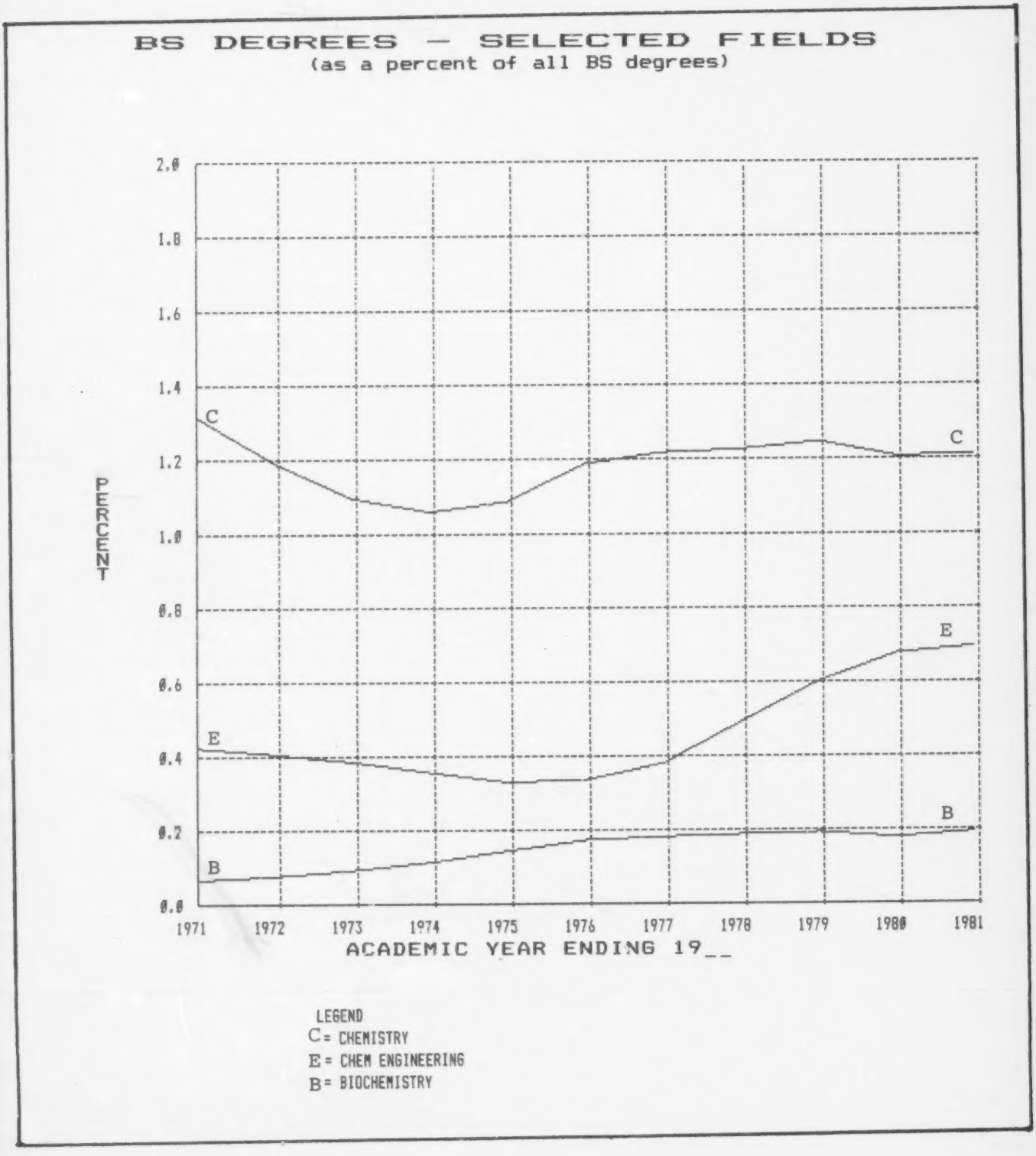
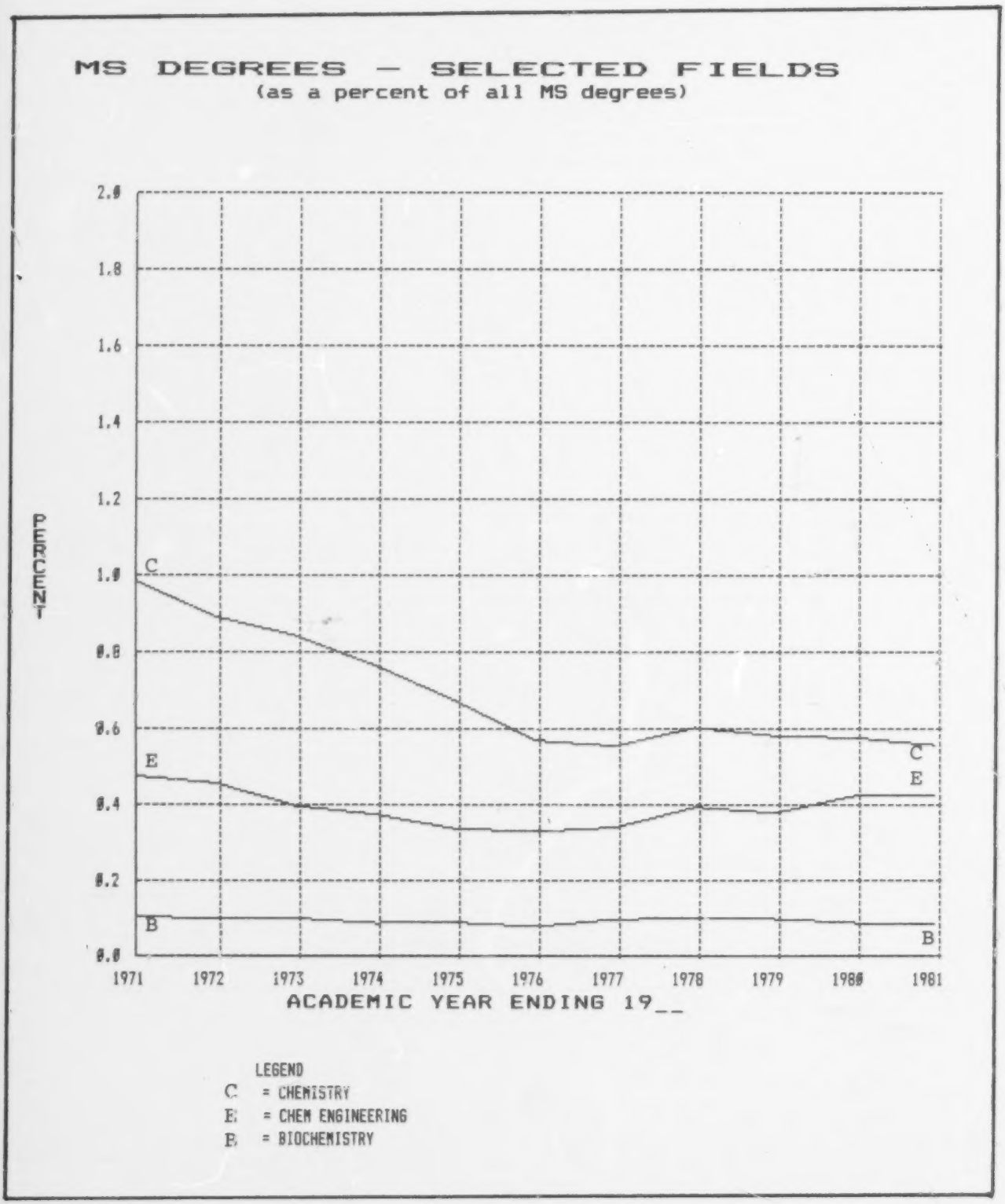
FIGURE 1.1



SOURCE: Table 1.2.6

FIGURE 1.2



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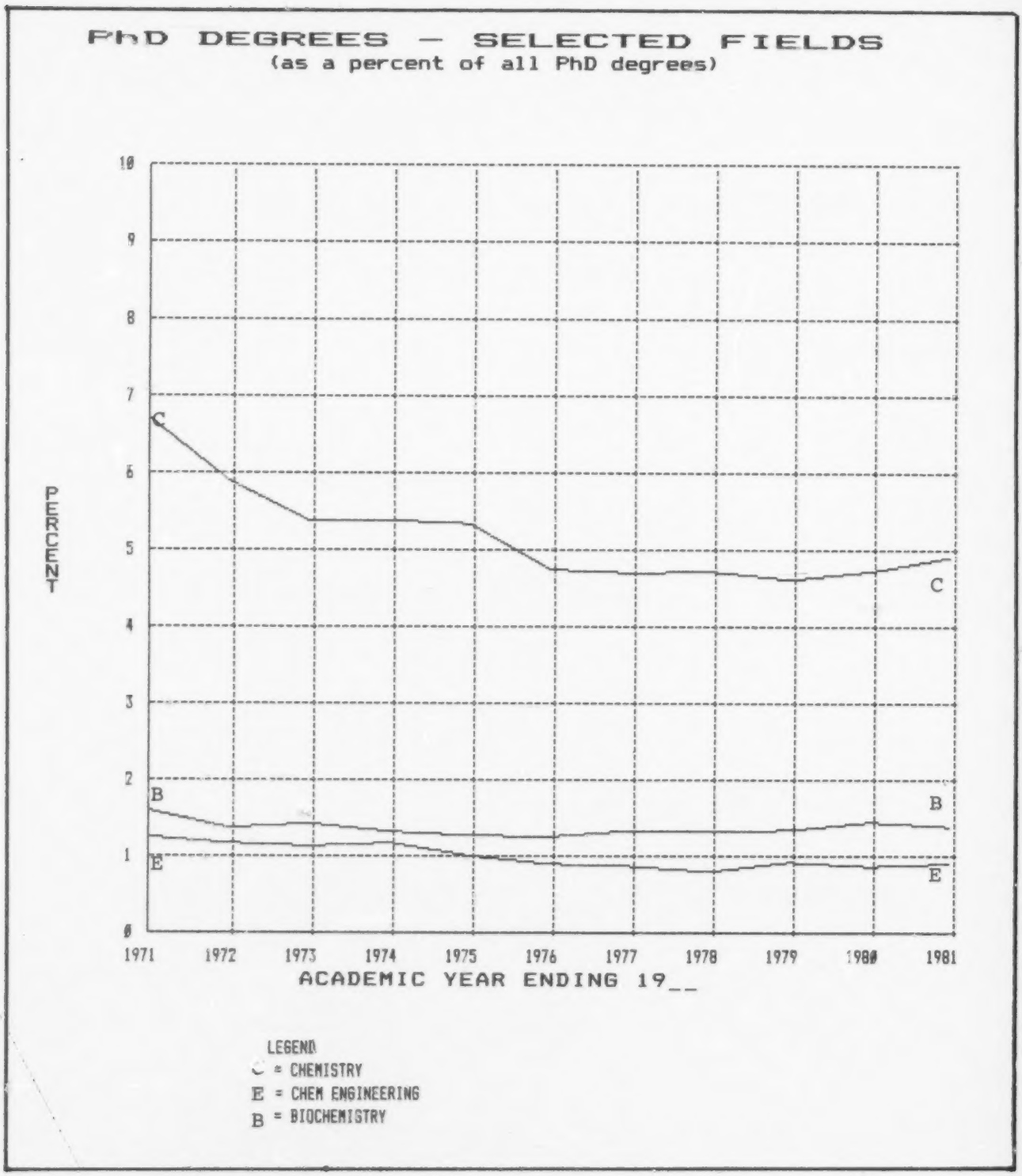

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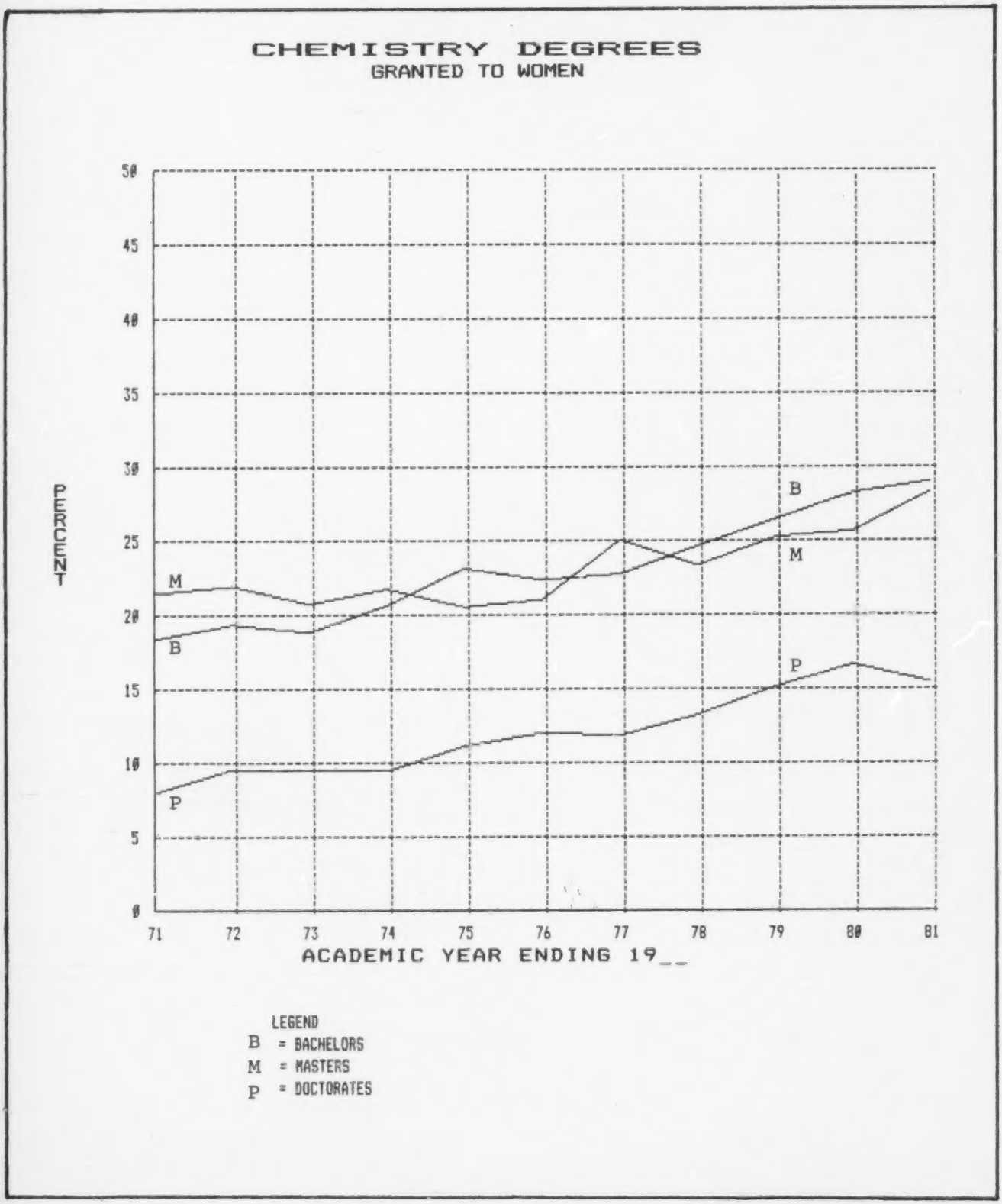
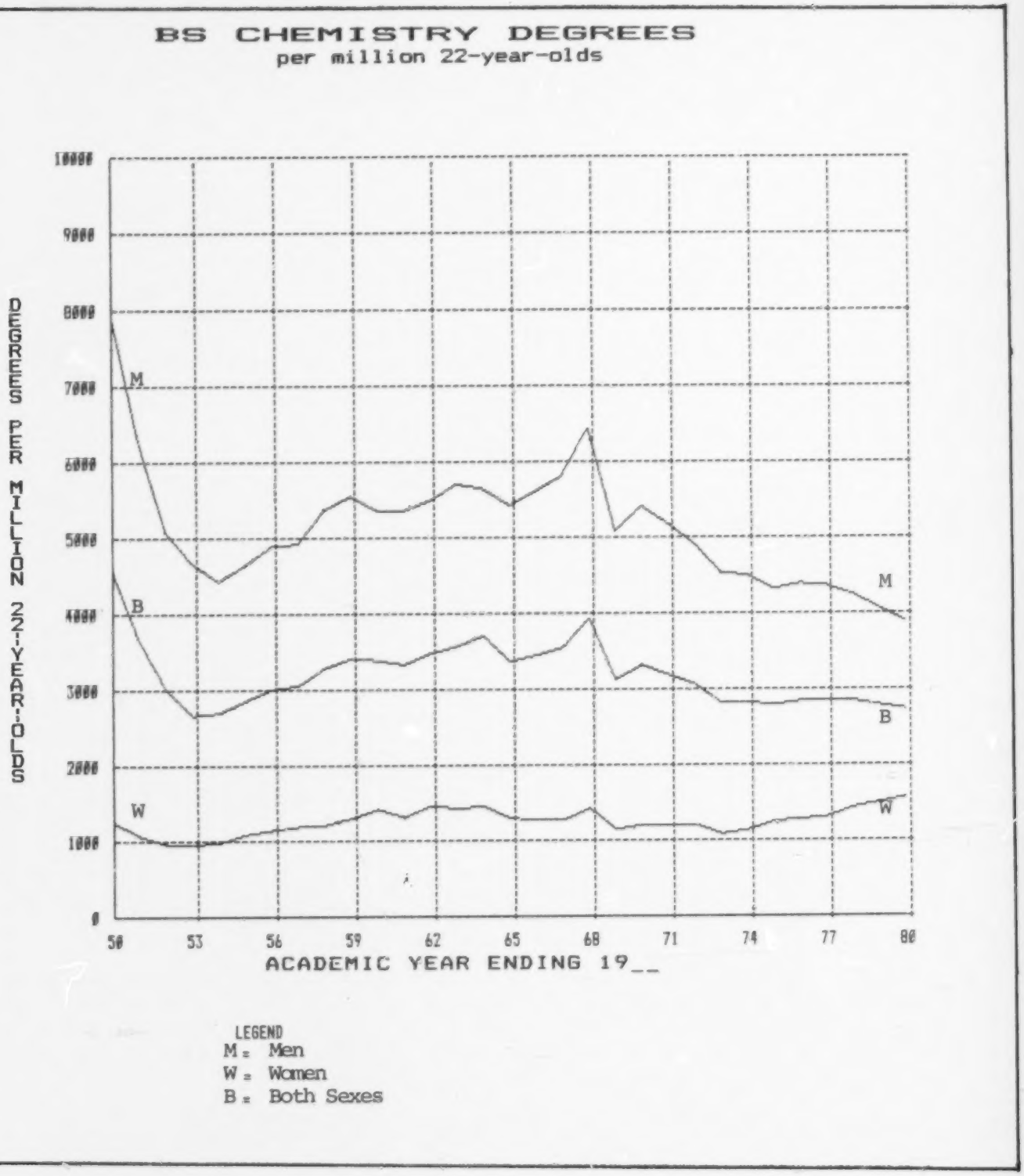


SOURCE: Table 1.2.10

FIGURE 1.5



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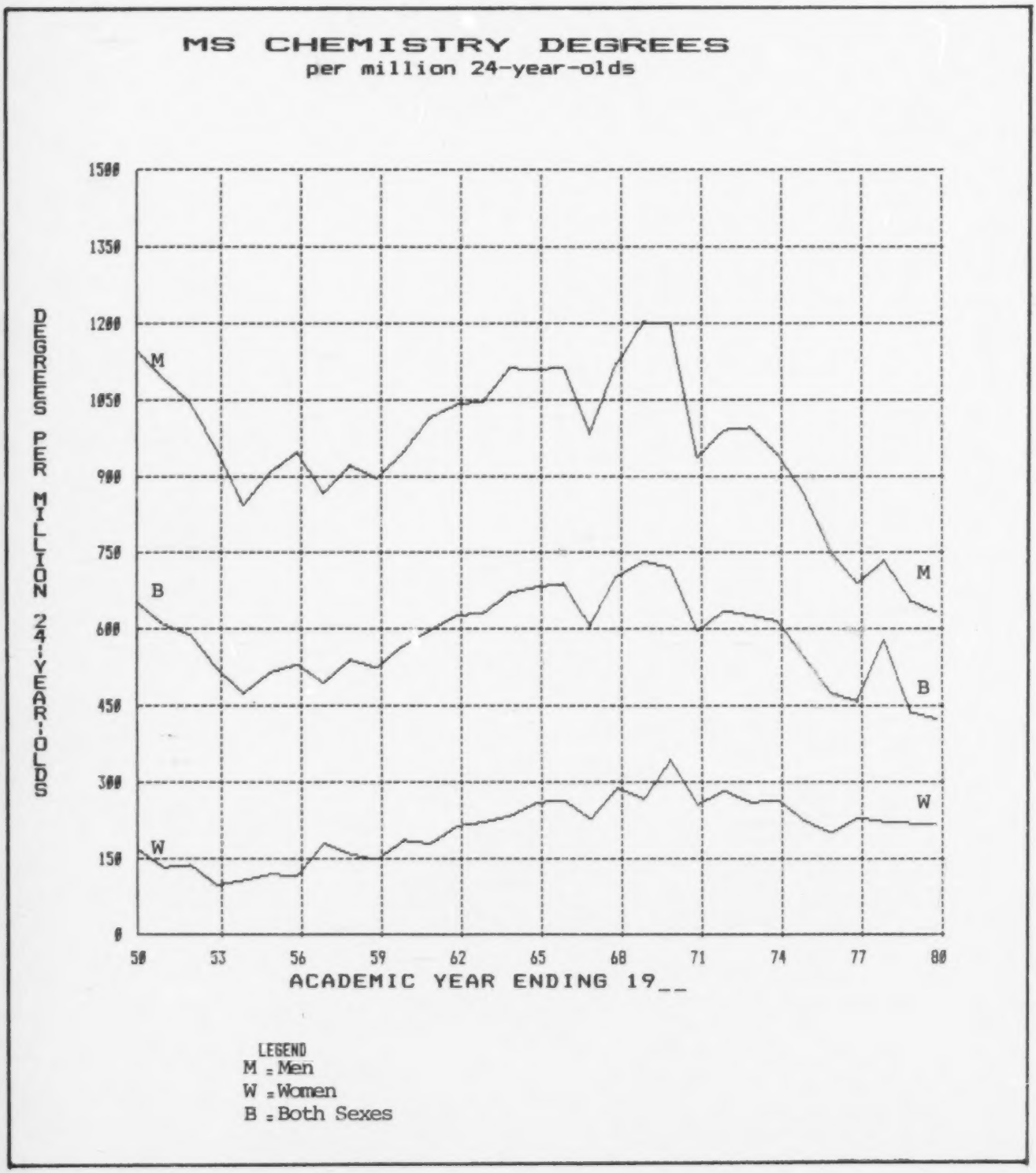

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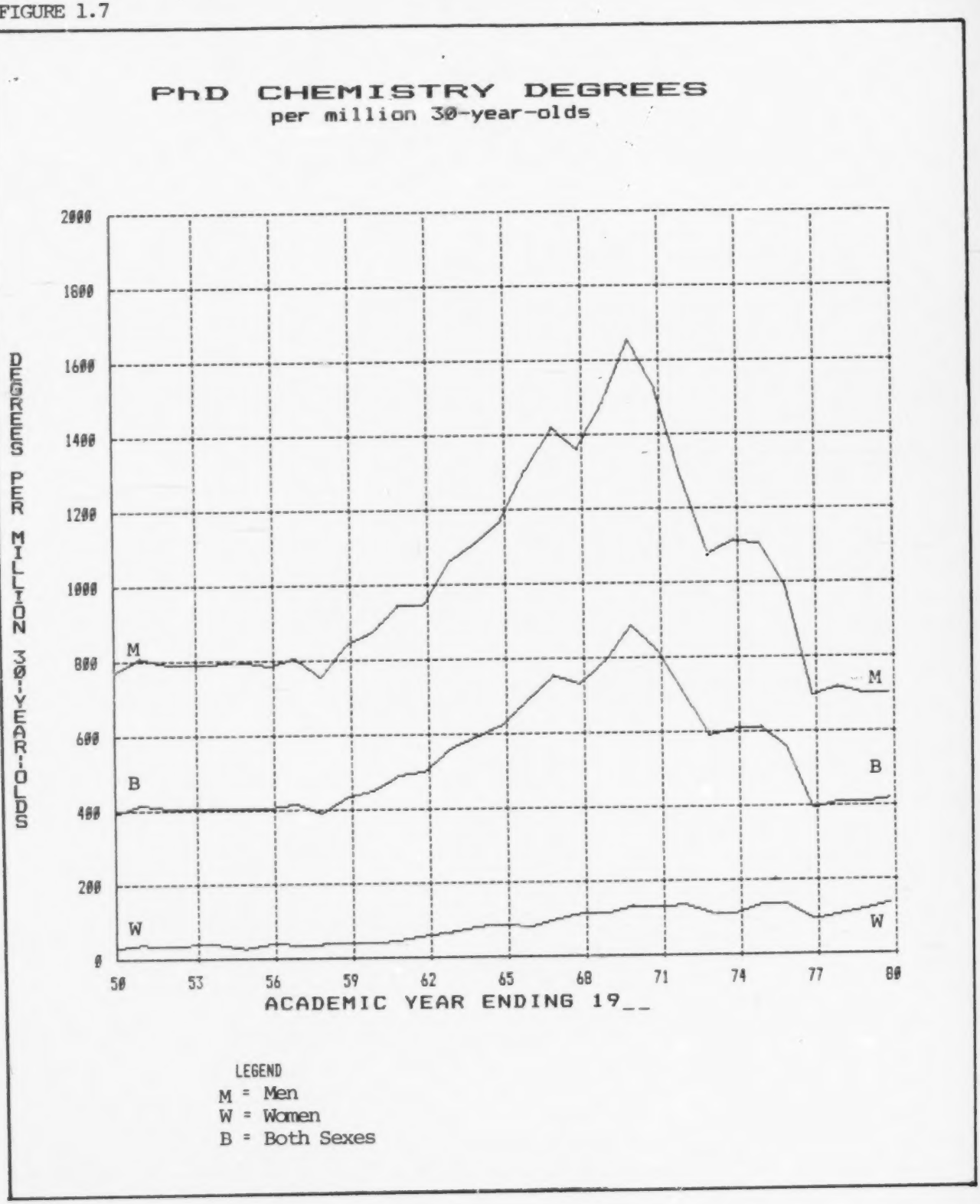

SOURCE: Table 1.2.14

TABLE 1.1.1

AN ASSESSMENT OF RESEARCH DOCTORATE PROGRAMS IN CHEMISTRY

INSTITUTION	Faculty[1] Quality	Effectiveness[2] in educating research	Improvement[3] in quality	Evaluators'[4] Familiarity
U. of Akron				
Chemistry	40	40	55	39
Polymer Science	48	50	55	35
U. of Alabama	42	41	45	44
American U.*	34	32	43	36
U. of Arizona-Tucson	54	56	62	53
Arizona St. U.	50	53	52	47
U. of Arkansas	46	45	51	43
Atlanta U. *	29	26	n.a.	34
Auburn U.	39	38	45	38
Baylor U.	38	37	40	38
Boston C.	40	39	51	42
Boston U.	45	45	46	46
Brandeis U.	56	57	44	54
Brigham Young U.	45	45	51	42
Brown U.	54	54	41	50
Bryn Mawr C.	36	35	39	41
U. of California				
Berkeley	74	72	63	74
Davis	55	56	59	54
Irvine	56	56	60	56
Los Angeles	69	67	61	68
Riverside	51	49	42	52
San Diego	62	59	56	59
Santa Barbara	57	56	66	59
Santa Cruz	48	49	30	47
California Inst. of Tech	74	73	56	73
Carnegie-Mellon U.	54	53	37	52
Case Western Reserve U.	53	53	26	53
Catholic U. of America	36	36	31	39
U. of Chicago	69	67	44	69
U. of Cincinnati	52	54	53	53
City U. of New York				
Graduate School	48	46	43	44
Clark U.	35	33	38	37
Clarkson C. of Tech.	44	46	46	47
Clemson U.	39	39	56	43
U. of Colorado	58	57	58	58
Colorado St. U.	56	55	80	60
Columbia U.	70	70	60	67
U. of Connecticut	46	47	48	42
U. of Missouri				
Columbia	42	40	45	45
Kansas City	40	40	49	40
Rolla	39	39	47	42
Montana St. U.	39	38	56	38
U. of Nebraska at Lincoln	53	54	71	53
U. of New Hampshire	42	42	41	41
U. of New Mexico	42	45	52	40
U. of New Orleans	46	45	41	48
New York U.	48	48	36	48
U. of North Carolina	62	63	69	60
North Carolina St. U.	45	48	58	45
U. of North Dakota	39	34	41	39
North Dakota St. U.	37	36	43	37
North Texas St. U.	40	36	46	39
Northeastern U.	41	43	52	43
Northern Illinois U.	38	38	45	40
Northwestern U.	65	64	45	67
U. of Notre Dame	51	50	44	55
Ohio U.	40	39	35	41
Ohio St. U.	63	62	52	66
U. of Oklahoma	47	48	55	44
Oklahoma St. U.	44	45	57	44
U. of Oregon	58	57	58	53
Oregon St. U.	52	54	52	51
U. of Pennsylvania	59	59	55	59
Pennsylvania St. U.	60	60	54	64
U. of Pittsburgh	57	57	41	58
Poly. Inst. of New York	44	48	35	40
Princeton U.	64	64	3[illegible]	67
Purdue U.	64	62	5[illegible]	69
Rensselaer Poly. Inst.	50	53	5[illegible]	45
U. of Rhode Island	41	42	47	38
Rice U.	58	59	52	57
U. of Rochester	59	60	68	56
Rutgers U.				
New Brunswick	52	53	50	5[illegible]
Newark	41	42	43	42
U. of South Carolina	52	54	73	49

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Cornell U.	68	67	53	70
U. of Delaware	49	52	50	49
U. of Denver	38	37	53	40
Drexel U.	39	40	51	43
Duke U.	54	55	58	50
Emory U.	47	49	70	47
U. of Florida	57	57	56	55
Florida St. U.	57	57	51	58
Georgetown U.	44	47	49	41
Georgia Inst. of Tech.	55	55	56	55
U. of Georgia	55	54	47	55
Harvard U.	74	71	40	71
U. of Hawaii	47	48	52	46
U. of Houston	51	52	63	51
Howard U.	43	42	62	41
U. of Idaho	41	39	49	43
U. of Illinois				
Chicago Circle	47	48	52	49
Urbana	69	69	49	71
Illinois Inst. of Tech	43	42	28	47
Indiana U.	62	60	61	64
Inst. of Paper Chemistry	36	41	38	34
U. of Iowa	49	51	41	49
Iowa St. U.	60	63	47	61
Johns Hopkins U.	56	56	35	55
U. of Kansas				
Chemistry	50	53	40	47
Pharmaceutical chemistry	44	50	n.a.	33
Kansas St. U.	49	49	61	50
Kent St. U.	43	45	41	40
U. of Kentucky	43	43	51	45
Louisiana St. U.	53	52	46	51
U. of Louisville	38	37	44	37
Loyola U. of Chicago	38	39	41	41
U. of Maryland	54	54	51	53
U. of Massachusetts	51	55	50	50
Massachusetts Inst. of Tech.	73	71	54	71
U. of Miami (Fla.)	37	35	45	39
U. of Michigan	58	58	40	63
Michigan St. U.	60	59	45	62
U. of Minnesota	61	59	68	61
U. of South Florida	37	35	43	41
U. of Southern California	59	56	73	57
Southern Illinois U. Carbondale	41	40	33	44
U. of Southern Mississippi	32	30	47	35
Stanford U.	70	68	35	69
State U. of New York				
Binghamton	44	45	47	47
Buffalo	55	55	50	56
Stony Brook	56	54	49	57
C. of Environmental Science & Forestry	44	42	30	38
Syracuse U.	48	49	46	50
Temple U.	41	40	47	41
U. of Tennessee	47	49	52	41
Texas A&M U.	61	58	67	61
Texas Tech. U.	46	46	59	49
U. of Texas	63	61	64	61
Tulane U.	40	40	35	46
Utah St. U.	40	41	52	37
U. of Utah	62	59	73	63
Vanderbilt U.	50	50	49	48
U. of Vermont	46	46	51	45
U. of Virginia	52	53	67	51
Virginia Poly. Inst & St. U	48	51	57	48
U. of Washington	59	57	49	58
Washington St. U	50	54	57	46
Washington U. (MO)	52	52	52	48
Wayne St. U	54	54	45	56
Western Michigan U.	34	31	38	39
U. of Wisconsin				
Madison	69	67	49	70
Milwaukee*	43	45	61	44
U. of Wyoming	38	35	42	43
Yale U.	64	64	52	64

* indicates program was initiated since 1970.

NOTE: Ratings are standardized on a scale where 50 represents the average of all rated departments.

1 Mean rating of the scholarly quality of program faculty.
2 Mean rating of the effectiveness of the program in educating research.
3 Mean rating of the improvement in program quality in the last five years.
4 Mean rating of the evalutators' familiarity with the work of program faculty.

SOURCE: The Conference Board of Associated Research Councils, An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences, National Academy Press, Washington, D.C., 1982.
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TABLE 1.1.2

AN ASSESSMENT OF RESEARCH DOCTORATE PROGRAMS IN CHEMICAL ENGINEERING

INSTITUTION	Faculty[1] Quality	Effectiveness[2] in educating research	Improvement[3] in quality	Evaluators'[4] Familiarity
U. of Akron	32	29	42	34
Auburn U.*	34	34	49	43
Brigham Young U.	47	48	55	47
City U. of New York Graduate School	51	51	42	48
U. of California				
Berkeley	71	70	48	70
Los Angeles	49	47	69	48
California Inst. of Tech	71	70	67	68
Carnegie-Melon U.	60	61	44	62
Case Western Reserve U.	51	53	46	49
Catholic U. of America	34	32	36	36
U. of Cincinnati	44	44	45	43
Clarkson C.	48	50	44	50
Clemson U.	39	40	43	40
U. of Colorado	53	53	54	58
Columbia U.	47	48	39	46
U. of Connecticut	49	48	63	50
Cornell U.	57	57	62	58
U. of Delaware	69	67	46	70
U. of Florida	54	55	45	53
Georgia Inst. of Tech.	50	50	69	51
U. of Houston	65	61	74	66
U. of Idaho	33	35	37	36
U. of Illinois	64	66	37	63
Illinois Inst. of Tech	47	48	36	53
Iowa St. U.	54	56	55	53
U. of Kansas	44	43	46	39
Kansas St. U.	44	44	45	43
U. of Kentucky	41	42	51	41
Lehigh U.	50	53	51	50
Louisiana St. U.	47	47	49	43
U. of Maryland	47	48	44	45
U. of Massachusetts	55	56	65	56
Massachusetts Inst. of Tech.	67	65	57	66
U. of Michigan	57	57	29	63
Michigan St. U.	42	43	47	42
U. of Minnesota	73	73	50	70
U. of Missouri				
Columbia	43	43	49	43
Rolla	47	47	55	45
Montana St. U.	33	34	31	37
New Jersey Inst. of Tech.	40	37	51	40
North Carolina St. U.	50	52	62	47
Northwestern U.	62	63	52	64
U. of Notre Dame	56	56	67	59
Ohio State U.	50	52	49	48
U. of Oklahoma	47	49	46	43
Oklahoma St. U.	46	47	52	42
Oregon St. U.	52	51	47	54
U. of Pennsylvania	63	61	63	65
Pennsylvania St. U.	53	53	61	55
U. of Pittsburgh	45	48	53	45
Poly. Inst. of New York	41	42	30	42
Princeton U.	64	64	32	64
Purdue U.	61	60	68	64
Rensselaer Poly. Inst.	49	50	55	49
U. of Rhode Island*	40	36	54	39
Rice U.	56	55	43	55
U. of Rochester	54	53	54	55
Rutgers U.	41	41	45	40

U. of South Carolina	43	42	69	44
Stanford U.	70	70	48	67
St. U. of New York, Buffalo	55	52	46	56
C. of Envir. Sci. & Forestry	36	33	45	34
Stevens Inst. of Tech.	37	36	46	38
Syracuse U.	48	49	46	44
U. of Tennessee	49	49	49	45
U. of Texas	61	60	61	61
Texas A&M U.	48	47	48	45
Tulane U.	38	36	31	41
U. of Utah	40	40	55	39
Vanderbilt U.	39	40	44	36
U. of Virginia	48	50	66	55
Washington U. (Mo.)	52	54	58	51
U. of Washington	58	58	60	56
Wayne St. U	40	41	49	37
West Virginia U.	47	48	53	45
U. of Wisconsin	72	72	45	71
Worcester Polytechnic Inst.	40	40	38	41
Yale U.	50	50	43	48

* indicates program was initiated since 1970.

NOTE: Ratings are standardized on a scale where 50 represents the average of all rated departments .

1 Mean rating of the scholarly quality of program faculty.
2 Mean rating of the effectiveness of the program in educating research.
3 Mean rating of the improvement in program quality in the last five years.
4 Mean rating of the evalutators' familiarity with the work of program faculty.

SOURCE: The Conference Board of Associated Research Councils, An Assessment of Research-Doctorate Programs in the United States: Engineering, National Academy Press, Washington, D.C., 1982. Printed with permission from the National Academy of Sciences, copyright 1982.

TABLE 1.1.3

AN ASSESSMENT OF RESEARCH DOCTORATE PROGRAMS IN BIOCHEMISTRY

INSTITUTION	Faculty[1] Quality	Effectiveness[2] in educating research	Improvement[3] in quality	Evaluators'[4] Familiarity
U. of Alabama	49	51	68	46
Albany Medical College	41	-	-	39
U. of Arizona	50	49	53	45
U. of Arkansas	37			39
Auburn U.	35	-	-	37
Baylor C. of Medicine	51	50	51	53
Boston U.				
Biochemistry	50	49	61	48
Medical & dental sciences	48	44	48	47
Brandeis U.	67	66	46	71
Brown U.	52	45	49	47
Bryn Mawr C.	40	42	-	41
City U. of New York				
Graduate School	51	51	46	44
U. of California				
Berkeley	71	72	47	71
Davis	61	63	57	65
Irvine	54	51	50	54
Los Angeles	66	63	58	67
Riverside	50	53	53	48
San Diego				
Biology	63	61	59	62
Chemistry	66	63	63	66
San Francisco	69	64	74	71
Santa Barbara	54	46	41	54
Case Western Reserve U.	56	58	39	56
U. of Chicago	64	62	51	65
U. of Cincinnati	48	52	63	48
Colorado St. U.	44	44	51	45
U. of Colorado	53	48	65	53
Columbia U.	64	59	52	64
U. of Connecticut	50	47	40	50
Cornell U.	67	66	59	71
Cornell U. Med. Ctr.	60	59	42	58
Dartmouth College	47	44	37	46
U. of Delaware	48	49	64	50
Duke U.	63	64	57	63
Emory U.	45	40	52	46
U. of Florida	48	50	59	47
George Washington U.	47	46	43	44
U. of North Carolina	56	56	65	57
North Carolina St. U.	45	43	43	45
U. of North Dakota	41	-	-	45
North Dakota St. U.	33	-	-	38
Northern Ill. U.	34	30	-	41
Northwestern U.	61	58	48	62
U. of Notre Dame	40	38	-	43
Ohio St. U.				
Physiological chemistry	46	44	34	43
Biochemistry	48	45	39	48
U. of Oklahoma	46	48	46	47
Oklahoma St. U.	47	48	41	44
U. of Oregon	57	58	46	53
Oregon St. U.	55	57	60	55
U. of Pennsylvania	65	60	50	68
Pennsylvania St. U.				
Graduate school	50	54	52	48
Hershey Med. Ctr.	45	43	46	43
U. of Pittsburgh				
Arts & sciences	52	51	45	49
Medical school	46	45	27	46
Princeton U.	59	57	25	59
Purdue U.	57	56	51	58
U. of Rhode Island	37	36	-	39
Rice U.	55	55	65	54
U. of Rochester	48	48	53	47
Rockefeller U.	71	66	44	72
Rutgers U.	56	54	57	50
St. U. of New York				
Albany	43	34	31	45
Buffalo, graduate	48	44	43	43
Buffalo, medical	48	48	55	46
C. of Environmental Science & Forestry	30	29		38
Stony Brook*	54	55	63	56
Downstate Med. Ctr.	43	38	32	43
Upstate Med. Ctr.	43	39	-	41
St. Louis U.	51	51	45	52
U. of South Dakota	36	34	-	40
U. of S. California	54	51	49	54
Southern Ill. U.	39	37	52	41
Stanford U.	74	73	60	76

Georgetown U.	43	43	43	44
U. of Georgia	48	50	48	47
Harvard U.				
Graduate school	74	71	50	76
Medical school	69	67	45	68
U. of Hawaii	46	45	49	47
U. of Health Sciences - Chicago Medical School	43	34	-	41
U. of Houston	43	-	-	38
Howard U.	34	27	-	39
U. of Illinois Med. Ctr. at Chicago	48	48	41	46
U. of Illinois Urbana-Champaign	62	64	54	63
Illinois Inst. of Tech.	39	39	-	38
Indiana U. - Purdue U.	49	51	41	44
Iowa St. U.	53	54	42	56
U. of Iowa	59	56	63	58
Johns Hopkins U.	58	61	49	56
Kansas St. U.	43	43	50	44
U. of Kansas Graduate school	44	48	46	42
U. of Kansas Med. Ctr.	48	49	54	50
U. of Kentucky	46	43	41	48
Loma Linda U.	30	-	-	37
Louisiana St. U.	38	35	-	40
U. of Louisville	41	40	52	43
Loyola U. of Chicago	36	35	-	39
U. of Maryland Baltimore Prof. Schs.	45	45	56	46
College Park	42	-	-	39
Massachusetts Inst. of Tech.	74	74	57	74
U. of Massachusetts	48	49	54	47
Medical U. of South Carolina	43	45	-	41
U. of Miami	51	50	51	54
U. of Michigan	62	63	49	65
Michigan St. U.	57	58	53	56
U. of Minnesota	58	58	60	60
U. of Missouri	48	45	48	47
U. of Nebraska	40	43	52	42
U. of New Hampshire	32	-	-	37
U. of Medicine & Dentistry of New Jersey	39	36	-	40
New York U.	58	53	31	53
Syracuse U.*	41	42	36	44
Temple U.	53	51	48	52
U. of Tennessee	39	43	40	41
U. of Tennessee Center for the Health Sciences	49	48	50	43
Texas A&M U.	45	-	-	42
U. of Texas, Austin	54	55	37	53
U. of Texas Health Science Center, Houston	53	52	71	50
U. of Texas Health Science Center, San Antonio	50	49	77	46
U. of Texas Med. Branch Galveston	43	33	-	41
Thomas Jefferson U.	37	-	-	38
Tulane U.	44	38	-	41
U. of Utah	52	51	37	47
Vanderbilt U.	56	56	52	57
U. of Vermont	41	37	57	44
Virginia Commonwealth U.	45	50	73	43
Virginia Poly. Inst. and State U.	41	42	52	42
U. of Virginia	55	55	57	50
Wake Forest U.	41	35	43	43
U. of Washington	62	61	48	65
Washington St. U.	50	52	63	48
Wayne St. U.	49	48	34	47
West Virginia U.				
Agricultural biochem.	34	-	-	35
Medical biochem.	43	43	49	42
U. of Wisconsin, Madison				
Biochemistry	71	70	46	74
Physiological chemistry	59	59	41	58
U. of Wyoming	35	35	-	41
Yale U.	70	68	63	70
Yeshiva U., Albert Einstein C. of Medicine	54	53	36	52

* indicates program was initiated since 1970.

NOTE: Ratings are standardized on a scale where 50 represents the average of all rated departments .

1 Mean rating of the scholarly quality of program faculty.
2 Mean rating of the effectiveness of the program in educating research.
3 Mean rating of the improvement in program quality in the last five years.
4 Mean rating of the evalutators' familiarity with the work of program faculty.

SOURCE: The Conference Board of Associated Research Councils, An Assessment of Research-Doctorate Programs in the United States: Biological Sciences, National Academy Press, Washington, D.C., 1982.
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TABLE 1.2.1

DEGREES GRANTED BY U.S. COLLEGES: Total, Chemistry, Chemical Engineering, Biochemistry

Academic Year Ending	Total- All Fields			Chemistry			Chemical Engineering			Biochemistry		
	BS	MS	PhD	BS	MS	PhD	BS	MS	PhD	BS	MS	PhD
Actual:												
1970	792,316	206,291	29,866	11,519	2,111	2,166	3,694	1,045	438	455	239	449
1971	839,730	230,509	32,107	11,063	2,275	2,159	3,579	1,100	406	568	251	517
1972	887,273	251,633	33,363	10,590	2,248	1,971	3,625	1,154	394	699	252	462
1973	922,362	263,371	34,777	10,128	2,225	1,872	3,578	1,051	397	872	270	501
1974	945,776	277,033	33,816	10,048	2,125	1,823	3,399	1,044	400	1,101	249	451
1975	922,933	292,450	34,083	10,059	1,975	1,822	3,070	990	346	1,355	268	437
1976	925,746	311,771	34,064	11,022	1,783	1,621	3,140	1,031	308	1,622	252	431
1977	919,549	317,164	33,232	11,215	1,767	1,568	3,524	1,086	291	1,693	314	447
1978	921,204	311,620	32,131	11,315	1,886	1,521	4,569	1,235	259	1,752	319	428
1979	921,390	301,079	32,730	11,509	1,757	1,516	5,568	1,149	304	1,799	301	443
1980	929,417	298,081	32,615	11,232	1,723	1,545	6,320	1,270	284	1,686	268	475
1981	935,140	295,739	32,958	11,347	1,654	1,622	6,527	1,267	300	1,837	258	460
Projected:												
1982	945,000	303,000	33,300	11,400	1,700	1,670	6,620	1,360	316	1,890	273	466
1983	965,000	307,000	33,300	11,700	1,720	1,680	6,850	1,410	320	1,930	276	470
1984	985,000	310,000	33,500	11,900	1,740	1,700	7,190	1,460	325	1,970	279	476
1985	985,000	311,000	33,600	11,900	1,740	1,720	7,290	1,490	329	1,970	280	480
1986	981,000	309,000	33,700	11,900	1,730	1,740	7,360	1,510	334	1,960	278	485
1987	970,000	306,000	33,800	11,700	1,710	1,750	7,370	1,530	338	1,940	275	490
1988	949,000	301,000	33,800	11,500	1,690	1,770	7,400	1,540	341	1,900	271	493
1989	938,000	300,000	33,900	11,300	1,680	1,780	7,410	1,560	346	1,880	270	498
1990	930,000	301,000	33,800	11,200	1,690	1,790	7,440	1,600	348	1,860	271	500

Note: Data for academic years ending 1970 through 1980 are from Earned Degrees Conferred, a series published by the National Center for Education Statistics. Data for the academic year ending 1981 are from NCES unpublished figures. Data for academic years ending 1982 through 1990 are ACS estimates based on NCES's projections of the number of degrees granted at each degree level in all fields combined. Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.2

DEGREES GRANTED BY 4-YEAR COLLEGES AND UNIVERSITIES:
1969-70 through 1980-81

Year	Bachelor's	Master's	Ph.D.
1969-70	792,316	206,291	29,866
1970-71	839,730	230,509	32,107
1971-72	887,273	251,633	33,363
1972-73	922,362	263,371	34,777
1973-74	945,776	277,033	33,816
1974-75	922,933	292,450	34,083
1975-76	925,746	311,771	34,064
1976-77	919,549	317,164	33,232
1977-78	921,204	311,620	32,131
1978-79	921,390	301,079	32,730
1979-80	929,417	298,081	32,615
1980-81[1]	935,140	295,739	32,958

1 Data for academic year 1980-81 are from NCES unpublished figures.

SOURCE: National Center for Education Statistics, Earned Degrees Conferred series. Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.3

BACHELOR'S DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-81

Year	A Agriculture	B Biological Sciences	Bio-Chemistry	C Engineering	Chemical Engineering	D Mathematics	E Physical Sciences	Chemistry	Total Columns A-E
1969-70	9,144	37,389	455	44,479	3,694	27,442	21,439	11,519	139,893
1970-71	12,672	35,743	568	50,046	3,579	24,801	21,412	11,063	144,674
1971-72	13,516	37,293	699	51,164	3,625	23,713	20,745	10,590	146,431
1972-73	14,756	42,233	872	51,265	3,578	23,067	20,696	10,128	152,017
1973-74	16,253	48,340	1,101	50,286	3,399	21,635	21,178	10,048	157,692
1974-75	17,528	51,741	1,355	46,852	3,070	18,181	20,778	10,059	155,080
1975-76	19,402	54,275	1,622	46,331	3,140	15,984	21,465	11,022	157,457
1976-77	21,467	53,605	1,693	49,283	3,524	14,196	22,497	11,215	161,048
1977-78	22,650	51,502	1,752	55,654	4,569	12,569	22,986	11,315	165,361
1978-79	23,134	48,846	1,799	62,375	5,568	11,806	23,207	11,509	169,368
1979-80	22,802	46,370	1,686	69,893	6,320	11,378	23,410	11,232	172,853
1980-81[1]	21,886	43,216	1,837	75,000	6,527	11,078	23,952	11,347	175,132

1 Data for academic year 1980-81 are from unpublished NCES figures.
SOURCE: National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.4

MASTER'S DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-81

Year	A Agriculture	B Biological Sciences	Bio-Chemistry	C Engineering	Chemical Engineering	D Mathematics	E Physical Sciences	Chemistry	Total Columns A-E
1969-70	1,446	5,800	239	15,593	1,045	5,636	5,935	2,111	34,430
1970-71	2,457	5,728	251	16,443	1,100	5,191	6,367	2,275	36,186
1971-72	2,680	6,101	252	16,960	1,154	5,198	6,287	2,248	37,266
1972-73	2,807	6,263	270	16,619	1,051	5,028	6,257	2,225	36,974
1973-74	2,928	6,552	249	15,379	1,044	4,834	6,062	2,125	35,755
1974-75	3,067	6,550	268	15,348	990	4,327	5,807	1,975	35,099
1975-76	3,340	6,582	252	16,342	1,031	3,857	5,466	1,783	35,587
1976-77	3,724	7,114	314	16,245	1,086	3,695	5,331	1,767	36,109
1977-78	4,023	6,806	319	16,398	1,235	3,373	5,561	1,886	36,161
1978-79	3,994	6,831	301	15,495	1,149	3,036	5,451	1,757	34,807
1979-80	3,976	6,510	268	16,243	1,271	2,860	5,219	1,723	34,808
1980-81[1]	4,003	5,978	258	16,709	1,267	2,567	5,284	1,654	34,541

1 Data for academic year 1980-81 are from NCES unpublished figures.
SOURCE: National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.5

PHD DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-1981

Year	A Agriculture	B Biological Sciences	Bio-Chemistry	C Engineering	Chemical Engineering	D Mathematics	E Physical Sciences	Chemistry	Total Columns A-E
1969-70	726	3,289	449	3,681	438	1,236	4,312	2,166	13,244
1970-71	1,086	3,645	517	3,638	406	1,199	4,390	2,159	13,958
1971-72	971	3,653	462	3,671	394	1,128	4,103	1,971	13,526
1972-73	1,059	3,636	501	3,492	397	1,068	4,006	1,872	13,261
1973-74	930	3,439	451	3,312	400	1,031	3,626	1,823	12,338
1974-75	991	3,384	437	3,108	346	975	3,626	1,822	12,084
1975-76	928	3,392	431	2,821	308	856	3,431	1,621	11,428
1976-77	893	3,397	447	2,586	291	823	3,341	1,568	11,040
1977-78	971	3,309	428	2,440	259	805	3,133	1,521	10,658
1978-79	950	3,542	443	2,506	304	730	3,102	1,516	10,830
1979-80	991	3,636	475	2,507	284	724	3,089	1,545	10,947
1980-81[1]	1,067	3,718	460	2,561	300	728	3,141	1,622	11,215

1 Data for academic year 1980-81 are from NCES unpublished figures.
SOURCE: National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.6

PERCENT OF TOTAL BACHELOR'S DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-81

Year	A	B	C		D	E		Total
	Agriculture	Biological Sciences	Bio-Chemistry	Engineering	Chemical Engineering	Mathematics	Physical Sciences	Chemistry	Columns A-E
1969-70	1.15	4.72	0.06	5.61	0.47	3.46	2.70	1.45	17.65
1970-71	1.50	4.26	0.07	5.96	0.41	2.95	2.55	1.32	17.23
1971-72	1.52	4.20	0.08	5.76	0.41	2.67	2.34	1.20	16.50
1972-73	1.60	4.58	0.09	5.56	0.39	2.50	2.24	1.11	16.48
1973-74	1.71	5.11	0.11	5.31	0.36	2.29	2.23	1.06	16.67
1974-75	1.89	5.60	0.14	5.07	0.33	1.97	2.25	1.09	16.80
1975-76	2.09	5.86	0.17	5.00	0.34	1.72	2.32	1.19	17.00
1976-77	2.33	5.83	0.18	5.35	0.38	1.54	2.44	1.22	17.51
1977-78	2.45	5.59	0.19	6.04	0.49	1.36	2.49	1.23	17.95
1978-79	2.51	5.30	0.19	6.77	0.60	1.28	2.51	1.25	18.38
1979-30	2.45	4.99	0.18	7.41	0.68	1.22	2.52	1.21	18.59
1980-81[1]	2.34	4.62	0.19	8.02	0.69	1.18	2.56	1.21	18.73

SOURCE: Tables 1.2.2 and 1.2.3
National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.7

PERCENT OF TOTAL MASTER'S DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-81

Year	A Agriculture	B Biological Sciences	Bio-Chemistry	C Engineering	Chemical Engineering	D Mathematics	E Physical Sciences	Chemistry	Total Columns A-E
1969-70	0.71	2.81	0.11	7.56	0.50	2.73	2.87	1.02	16.69
1970-71	1.06	2.48	0.11	7.13	0.48	2.25	2.76	0.98	15.69
1971-72	1.06	2.42	0.10	6.74	0.46	2.06	2.49	0.89	14.79
1972-73	1.07	2.37	0.10	6.31	0.40	1.90	2.37	0.84	14.03
1973-74	1.05	2.36	0.09	5.55	0.38	1.74	2.19	0.77	12.90
1974-75	1.05	2.24	0.09	5.25	0.34	1.47	1.98	0.67	12.00
1975-76	1.07	2.11	0.08	5.24	0.33	1.23	1.75	0.57	11.41
1976-77	1.17	2.24	0.09	5.12	0.34	1.16	1.68	0.56	11.38
1977-78	1.28	2.18	0.10	5.26	0.39	1.08	1.78	0.60	12.17
1978-79	1.32	2.26	0.10	5.14	0.38	1.00	1.81	0.58	11.56
1979-80	1.33	2.18	0.09	5.45	0.42	0.96	1.75	0.58	11.67
1980-81	1.35	2.02	0.08	5.65	0.43	0.86	1.78	0.56	11.68

SOURCE: Tables 1.2.2 and 1.2.4
National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.8

PERCENT OF TOTAL PhD. DEGREES GRANTED IN SELECTED FIELDS:
1969-70 through 1980-81

Year	A Agriculture	B Biological Sciences	Bio-Chemistry	C Engineering	Chemical Engineering	D Mathematics	E Physical Sciences	Chemistry	Total Columns A-E
1969-70	2.43	11.01	1.50	12.32	1.47	4.14	14.44	7.25	44.34
1970-71	3.38	11.35	1.61	11.33	1.26	3.73	13.67	6.72	43.47
1971-72	2.91	10.95	1.38	11.00	1.18	3.38	12.30	5.90	40.54
1972-73	3.04	10.45	1.44	10.04	1.14	3.07	11.52	5.38	38.13
1973-74	2.75	10.16	1.33	9.79	1.18	3.04	10.72	5.40	36.49
1974-75	2.90	9.93	1.28	9.12	1.01	2.86	10.64	5.34	35.45
1975-76	2.72	9.96	1.26	8.28	0.90	2.51	10.07	4.76	33.54
1976-77	2.68	10.22	1.34	7.78	0.87	2.47	10.05	4.71	33.22
1977-78	3.02	10.30	1.33	7.59	0.80	2.50	9.75	4.73	33.17
1978-79	2.90	10.82	1.35	7.65	0.93	2.23	9.48	4.63	33.09
1979-80	3.04	11.15	1.45	7.68	0.87	2.22	9.47	4.73	33.56
1980-81	3.23	11.28	1.39	7.77	0.91	2.20	9.53	4.92	34.02

SOURCE: Tables 1.2.2 and 1.2.5
National Center for Education Statistics, Earned Degrees Conferred series.
Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.9

DEGREE LEVEL OF GRADUATES IN CHEMISTRY, CHEMICAL ENGINEERING, AND BIOCHEMISTRY:
1969-70 through 1980-81

	Chemistry				Chemical Engineering				Biochemistry			
Year	Total Number	B.S. #	M.S. #	Ph.D. #	Total Number	B.S. #	M.S. #	Ph.D. #	Total Number	B.S.	M.S.	Ph.D.
1969-70	15,796	72.9	13.4	13.7	5,177	71.3	20.2	8.5	1,143	39.8	20.9	39.3
1970-71	15,497	71.4	14.7	13.9	5,085	70.4	21.6	8.0	1,336	42.5	18.8	38.7
1971-72	14,809	71.5	15.2	13.3	5,173	70.1	22.3	7.6	1,413	49.5	17.8	32.7
1972-73	14,225	71.2	15.6	13.2	5,026	71.2	20.9	7.9	1,643	53.1	16.4	30.5
1973-74	13,996	71.8	15.2	13.0	4,843	70.2	21.6	8.2	1,801	61.1	13.8	25.1
1974-75	13,856	72.6	14.3	13.1	4,406	69.7	22.5	7.8	2,060	65.8	13.0	21.2
1975-76	14,426	76.4	12.4	11.2	4,479	70.1	23.0	6.9	2,305	70.4	10.9	18.7
1976-77	14,550	77.1	12.1	10.8	4,901	71.9	22.2	5.9	2,454	69.0	12.8	18.2
1977-78	14,722	76.9	12.8	10.3	6,063	75.3	20.4	4.3	2,499	70.1	12.8	17.1
1978-79	14,782	77.9	11.9	10.2	7,021	79.3	16.4	4.3	2,543	70.7	11.8	17.4
1979-80	14,500	77.5	11.9	10.6	7,874	80.3	16.1	3.6	2,429	69.4	11.0	19.6
1980-81	14,623	77.6	11.3	11.1	8,094	80.6	15.6	3.7	2,555	71.9	10.1	18.0

SOURCE: Tables 1.2.3, 1.2.4, and 1.1.5.
National Center for Education Statistics, Earned Degrees Conferred series. Figures are for colleges and universities in the 50 states, D.C. and U.S. territories.

TABLE 1.2.10

CHEMISTRY DEGREES GRANTED TO WOMEN:
1969-70 through 1980-81

Academic Year	Bachelor's			Master's			Ph.D.		
	Total Men & Women	Women		Total Men & Women	Women		Total Men & Women	Women	
		Number	% of Total		Number	% of Total		Number	% of Total
1969-70	11,519	2,066	17.9	2,111	473	22.4	2,166	166	7.7
1970-71	11,063	2,037	18.4	2,275	488	21.5	2,159	173	8.0
1971-72	10,590	2,057	19.4	2,248	495	22.0	1,971	190	9.6
1972-73	10,128	1,920	18.9	2,225	464	20.8	1,872	178	9.5
1973-74	10,048	2,085	20.7	2,125	464	21.8	1,823	173	9.5
1974-75	10,059	2,339	23.2	1,975	406	20.6	1,822	204	11.2
1975-76	11,022	2,472	22.4	1,783	377	21.1	1,621	196	12.1
1976-77	11,215	2,556	22.8	1,767	443	25.1	1,568	187	11.9
1977-78	11,315	2,797	24.7	1,886	441	23.4	1,521	203	13.3
1978-79	11,509	3,051	26.5	1,757	445	25.3	1,516	230	15.2
1979-80	11,232	3,182	28.3	1,723	444	25.7	1,545	258	16.7
1980-81	11,347	3,394	29.1	1,654	470	28.4	1,622	251	15.5

SOURCE: National Center for Education Statistics, Earned Degrees Conferred series, and unpublished figures for academic year 1980-81. Figures are for colleges and universities in the 50 states and D.C.

TABLE 1.2.11

ESTIMATES OF CHEMISTRY DEGREES GRANTED TO MINORITIES:
1973-74 through 1980-81

Degree Level and Academic Year	Total Number of Degrees Granted (1)	Percent Granted to Minorities(2)				Non-U.S. Citizens(2)
		Black	American Indian	Asian/ Pacific Islander	Hispanic	
Bachelor's						
1973-74	10,048	1.9	0.2	2.0	1.1	2.0
1974-75	10,059	1.4	0.1	2.0	0.9	1.8
1975-76	11,022	1.8	0.2	1.5	1.2	1.2
1976-77	11,215	1.8	0.3	2.2	1.4	1.9
1977-78	11,315	1.6	0.1	2.5	0.8	2.0
1978-79	11,509	1.6	0.2	2.4	1.3	2.3
1979-80	11,232	2.0	0.3	2.0	1.5	2.9
1980-81	11,347	2.7	0.4	2.8	1.7	2.3
Master's						
1973-74	2,125	2.6	0.0	1.3	0.0	13.4
1974-75	1,975	1.4	0.5	1.9	0.3	12.1
1975-76	1,783	2.7	0.0	2.1	1.1	9.9
1976-77	1,767	1.9	0.3	1.4	0.5	11.7
1977-78	1,886	3.5	0.3	1.0	0.6	12.6
1978-79	1,757	1.5	1.1	3.4	2.6	10.8
1979-80	1,723	1.3	0.6	4.5	1.3	10.3
1980-81	1,654	3.5	0.0	3.5	0.0	15.0
Ph.D.						
1973-74	1,823	1.2	0.2	0.8	0.8	12.7
1974-75	1,822	1.1	0.2	0.7	0.4	11.1
1975-76	1,621	0.6	0.0	2.8	0.8	12.4
1976-77	1,568	1.6	0.2	1.2	1.2	12.4
1977-78	1,521	2.8	0.3	1.8	1.0	12.2
1978-79	1,516	0.0	1.4	2.2	0.8	11.4
1979-80	1,545	0.6	0.0	2.8	0.6	10.1
1980-81	1,622	1.2	0.4	3.1	0.4	11.7

SOURCE: (1) National Center for Education Statistics, Earned Degrees Conferred series.

(2) ACS Starting Salary Survey series.

TABLE 1.2.12

CHEMISTRY BACHELOR DEGREES PER MILLION 22-YEAR OLDS IN THE U.S. POPULATION by Sex: 1950-1980

Year	Both Sexes			Men			Women		
	22-year olds (million)	Chemistry degrees	Degrees per million	22-year olds (million)	Chemistry degrees	Degrees per million	22-year olds (million)	Chemistry degrees	Degrees per million
1950	10,619	2,325	4,567	9,134	1,151	7,936	1,485	1,173	1,266
1951	8,258	2,258	3,657	7,036	1,119	6,288	1,222	1,139	1,073
1952	6,819	2,255	3,024	5,717	1,123	5,091	1,102	1.131	974
1953	5,943	2,224	2,672	4,870	1,112	4,379	1,073	1,112	965
1954	5,791	2,140	2,706	4,727	1,065	4,438	1,064	1,075	990
1955	5,920	2,066	2,865	4,781	1,027	4,655	1,139	1,039	1,096
1956	6,178	2,045	3,021	4,996	1,019	4,903	1,182	1,026	1,152
1957	6,591	2,151	3,064	5,297	1,074	4,932	1,294	1,077	1,201
1958	7,010	2,129	3,293	5,705	1,061	5,377	1,305	1,067	1,223
1959	7,308	2,138	3,418	5,897	1,062	5,553	1,411	1,076	1,311
1960	7,603	2,239	3,396	6,005	1,119	5,366	1,598	1,120	1,427
1961	7,604	2,277	3,339	6,096	1,136	5,366	1,508	1,141	1,322
1962	8,089	2,323	3,482	6,374	1,160	5,495	1,715	1,163	1,475
1963	8,823	2,465	3,579	7,055	1,235	5,713	1,768	1,231	1,436
1964	9,724	2,618	3,714	7,810	1,312	5,953	1,914	1,307	1,464
1965	10,047	2,974	3,378	8,111	1,493	5,433	1,936	1,481	1,307
1966	9,735	2,814	3,459	7,934	1,411	5,623	1,801	1,403	1,284
1967	9,872	2,777	3,555	8,101	1,393	5,816	1,771	1,384	1,280
1968	10,847	2,747	3,949	8,882	1,378	6,446	1,965	1,369	1,435
1969	11,807	3,761	3,139	9,651	1,894	5,096	2,156	1,867	1,155
1970	11,617	3,491	3,328	9,501	1,755	5,414	2,116	1,735	1,220
1971	11,183	3,494	3,201	9,088	1,752	5,187	2,095	1,743	1,202
1972	10,721	3,485	3,076	8,601	1,748	4,920	2,120	1,737	1,220
1973	10,226	3,615	2,829	8,259	1,818	4,543	1,967	1,798	1,094
1974	10,525	3,704	2,842	8,413	1,864	4,513	2,112	1,840	1,148
1975	10,649	3,796	2,805	8,264	1,909	4,329	2,385	1,887	1,264
1976	11,107	3,890	2,855	8,610	1,955	4,404	2,497	1,936	1,290
1977	11,322	3,961	2,858	8,720	1,993	4,375	2,602	1,969	1,321
1978	11,474	4,012	2,860	8,593	2,018	4,258	2,881	1,994	1,445
1979	11,643	4,156	2,801	8,530	2,093	4,075	3,113	2,064	1,508
1980	11,446	4,168	2,746	8,169	2,095	3,899	3,277	2,073	1,581

SOURCE: National Science Foundation, Science and Engineering Degrees: 1950-80, A Source Book, Special Report, (NSF 82-307).

TABLE 1.2.13

CHEMISTRY MASTERS DEGREES PER MILLION 24-YEAR OLDS IN THE U.S. POPULATION by Sex: 1950-1982

Year	Both Sexes			Men			Women		
	24-year olds (million)	Chemistry degrees	Degrees per million	24-year olds (million)	Chemistry degrees	Degrees per million	24-year olds (million)	Chemistry degrees	Degrees per million
1950	2,413	1,575	653	1,191	1,368	1,149	1,222	208	170
1951	2,397	1,462	610	1,188	1,300	1,094	1,210	162	134
1952	2,389	1,409	590	1,186	1,242	1,047	1,203	167	139
1953	2,313	1,211	524	1,148	1,095	954	1,166	116	99
1954	2,305	1,098	476	1,150	972	845	1,155	126	109
1955	2,272	1,173	516	1,139	1,036	910	1,134	137	121
1956	2,187	1,164	532	1,091	1,035	949	1,096	129	118
1957	2,109	1,047	496	1,051	913	869	1,058	134	182
1958	2,081	1,125	541	1,038	958	923	1,042	167	160
1959	2,182	1,145	525	1,092	981	898	1,091	164	150
1960	2,160	1,228	569	1,079	1,025	950	1,081	203	188
1961	2,191	1,313	599	1,093	1,113	1,018	1,140	200	182
1962	2,270	1,425	628	1,130	1,179	1,043	1,163	246	216
1963	2,310	1,463	633	1,147	1,204	1,050	1,188	259	223
1964	2,359	1,145	672	1,171	1,306	1,115	1,188	280	236
1965	2,506	1,228	684	1,248	1,387	1,111	1,258	328	261
1966	2,664	1,839	690	1,328	1,484	1,117	1,336	355	266
1967	3,023	1,831	606	1,507	1,484	985	1,516	347	229
1968	2,861	2,014	704	1,422	1,596	1,122	1,439	418	290
1969	2,824	2,070	733	1,403	1,689	1,204	1,421	381	268
1970	2,779	2,146	722	1,387	1,666	1,201	1,392	480	345
1971	3,827	2,284	597	1,911	1,792	938	1,916	492	257
1972	3,548	2,259	637	1,767	1,754	993	1,780	505	284
1973	3,553	2,230	628	1,766	1,763	998	1,787	467	261
1974	3,542	2,138	617	1,761	1,664	945	1,780	474	266
1975	3,674	2,006	546	1,832	1,590	868	1,842	416	226
1976	3,765	1,779	477	1,879	1,413	752	1,886	383	203
1977	3,856	1,775	460	1,928	1,327	690	1,933	448	232
1978	3,953	1,892	579	1,969	1,447	735	1,894	445	224
1979	4,027	1,765	438	2,008	1,318	656	2,019	447	221
1980	4,080	1,733	425	2,033	1,286	633	2,047	447	218

SOURCE: National Science Foundation, Science and Engineering Degrees: 1950-80, A Source Book, Special Report, (NSF 82-307).

TABLE 1.2.14

CHEMISTRY DOCTORATE DEGREES PER MILLION 30-YEAR OLDS IN THE U.S. POPULATION by Sex: 1950-1980

Year	Both Sexes			Men			Women		
	30-year olds (million)	Chemistry degrees	Degrees per million	30-year olds (million)	Chemistry degrees	Degrees per million	30-year olds (million)	Chemistry degrees	Degrees per million
1950	2,416	953	394	1,186	914	771	1,230	39	32
1951	2,502	1,046	418	1,227	994	810	1,274	52	41
1952	2,531	1,031	408	1,246	986	794	1,289	45	35
1953	2,448	996	407	1,198	948	791	1,250	51	41
1954	2,482	1,013	408	1,218	968	795	1,264	45	40
1955	2,470	1,005	407	1,213	969	799	1,257	36	29
1956	2,414	986	408	1,187	934	787	1,227	52	42
1957	2,399	1,003	418	1,182	955	808	1,217	48	39
1958	2,388	939	393	1,177	890	756	1,211	49	40
1959	2,315	1,009	436	1,139	960	843	1,176	49	42
1960	2,311	1,048	453	1,142	1,000	876	1,169	48	41
1961	2,293	1,131	493	1,136	1,074	945	1,157	57	49
1962	2,266	1,139	503	1,126	1,070	950	1,139	69	61
1963	2,222	1,254	564	1,105	1,176	1,064	1,117	78	70
1964	2,187	1,301	595	1,086	1,208	1,112	1,101	93	84
1965	2,260	1,414	626	1,121	1,313	1,171	1,139	101	89
1966	2,293	1,131	691	1,128	1,477	1,309	1,146	94	82
1967	2,311	1,139	755	1,144	1,626	1,421	1,167	118	101
1968	2,398	1,757	733	1,186	1,615	1,362	1,213	142	117
1969	2,444	1,941	794	1,207	1,796	1,488	1,237	145	117
1970	2,486	2,208	888	1,231	2,039	1,656	1,255	169	135
1971	2,627	2,160	822	1,303	1,987	1,525	1,324	173	131
1972	2,798	1,971	707	1,384	1,778	1,285	1,405	193	137
1973	3,167	1,882	594	1,572	1,698	1,080	1,594	184	115
1974	2,995	1,828	610	1,484	1,655	1,115	1,511	173	114
1975	2,952	1,824	615	1,464	1,619	1,106	1,487	205	138
1976	2,896	1,623	560	1,442	1,426	989	1,454	197	135
1977	3,970	1,571	396	1,981	1,383	698	1,989	188	95
1978	3,609	1,525	413	1,836	1,322	720	1,854	203	109
1979	3,697	1,518	411	1,834	1,288	702	1,863	230	123
1980	3,685	1,551	421	1,832	1,291	705	1,853	260	140

SOURCE: National Science Foundation, Science and Engineering Degrees: 1950-80, A Source Book, Special Report (NSF 82-307).

TABLE 1.3.1

FULL-TIME SCIENCE AND ENGINEERING GRADUATE STUDENTS
IN DOCTORATE-GRANTING INSTITUTIONS
by Field and Citizenship
1974 and 1979

Field	Foreign as % of Total		Foreign		Total	
	1974	1979	1974	1979	1974	1979
All Science/Engineering	16.2	20.0	31,694	44,795	195,906	224,057
Engineering	32.6	41.2	11,004	16,179	33,717	39,282
Chemical	42.3	44.7	1,402	1,855	3,318	4,351
Physical Sciences	20.9	23.7	4,478	5,187	21,416	21,922
Environmental Sciences	10.0	12.9	867	1,280	8,201	9,919
Mathematical/Computer Sciences	18.8	30.5	2,520	4,253	13,409	13,959
Life Sciences	11.9	12.3	6,495	8,153	54,650	66,536
Agricultural Sciences	20.6	21.8	1,746	2,241	8,493	10,264
Biological Sciences	10.6	11.2	3,380	3,907	32,029	34,873
Biochemistry	13.5	12.0	464	420	3,433	3,499
Health Sciences	9.7	9.4	1,369	2,005	14,128	21,399
Psychology and Social Sciences	9.8	13.4	6,330	9,743	64,513	72,439

SOURCE: National Science Foundation, Foreign Participation in U.S. Science and Engineering Higher Education and Labor Markets, (NSF 81-316).

TABLE 1.3.2

FOREIGN STUDENTS IN U.S. INSTITUTIONS
by Field of Study: 1979-80 and 1981-82
Ranked by Foreign As Percent of Total

Field of study	1979-1980 Number of foreign students	1979-1980 Foreign as percent of total	1981-1982 Number of foreign students	1981-1982 Foreign as percent of total
Total	286,340	100.0%	326,300	100.0%
Engineering	66,090	23.1	62,300	19.1
Business	48,370	16.9	59,420	18.2
Undeclared	20,130	7.0	22,660	6.9
Social sciences	14,550	5.1	16,140	5.0
Computer & information sciences	8,610	3.0	15,690	4.8
English language	12,170	4.2	14,700	4.5
Physical sciences	11,030	3.8	14,190	4.4
Education	12,340	4.2	12,410	3.8
Engineering related technologies	10,860	3.8	11,350	3.5
Life sciences	9,100	3.2	9,550	2.9
Agriculture	8,750	3.1	8,880	2.7
Health sciences	8,680	3.0	8,480	2.6
Visual & performing arts	8,590	3.0	8,330	2.6
Mathematics	5,370	1.9	6,930	2.1
Architecture & environmental design	5,700	2.0	6,340	1.9
Letters	5,070	1.8	6,300	1.9
Communications	2,790	1.0	5,340	1.7
Liberal & general studies	---	---	5,530	1.7
Interdisciplinary studies	6,590	2.3	4,280	1.3
Foreign languages	2,560	0.9	3,150	1.0
Allied health	2,270	0.8	3,090	1.0
Psychology	2,740	1.0	3,340	1.0
Public affairs	3,730	1.3	2,900	0.9
Theology	3,710	1.3	2,750	0.8
Home economics	1,550	0.5	2,680	0.8
Area & ethnic studies	1,510	0.5	2,280	0.7
Construction trades	---	---	1,570	0.5
Law	1,080	0.4	1,790	0.5
Science technologies	1,750	0.6	1,130	0.3
Industrial arts	---	---	520	0.2
Library & archival sciences	590	0.2	630	0.2
Philosophy & religion	---	---	610	0.2
Military technologies	---	---	210	0.1
Personal & social development *	---	---	290	0.1
Protective services	---	---	430	0.1
Parks & recreation	---	---	110	---

* Includes skills, citizenship and civic activities, health-related activites, interpersonal skills, leisure and recreational activites, and personal awareness.

SOURCE: Institute of International Education, as reported in Chronicle of Higher Education, December 8, 1982. Reprinted with permission from The Chronicle of Higher Education, copyright 1982.

TABLE 1.4.1

RESEARCH ASSISTANTSHIPS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD AND SOURCE OF SUPPORT: FALL 1975-80

Field	Total				Federal				Non-federal			
	1975	1977	1979	1980	1975	1977	1979	1980	1975	1977	1979	1980
Total	40,136	43,896	48,416	50,914	23,077	25,179	27,841	29,055	17,059	18,717	20,575	21,819
Engineering	11,027	11,944	12,937	14,058	6,967	7,614	8,083	8,562	4,060	4,330	4,854	5,496
Chemical	1,362	1,450	1,687	1,899	811	866	917	1,068	551	584	770	831
Physical Sciences	6,422	6,784	7,691	8,235	5,470	5,746	6,440	6,932	952	1,038	1,251	1,303
Chemistry	3,233	3,597	4,085	4,541	2,664	2,883	3,285	3,733	569	714	880	808
Physics	2,880	2,904	3,318	3,420	2,563	2,626	2,921	2,959	317	278	397	461
Environmental Sci.	2,829	3,196	3,461	3,615	2,086	2,278	2,619	2,650	743	918	842	965
Mathematical Sci.	1,375	1,504	1,615	1,796	752	877	1,002	1,099	623	627	613	697
Life Sciences	11,311	13,090	15,036	15,515	5,362	6,181	7,085	7,498	5,949	6,909	7,951	8,017
Psychology	2,207	2,285	2,323	2,358	1,003	1,020	1,140	901	1,204	1,265	1,183	1,457
Social Sciences	4,965	5,093	5,353	5,337	1,437	1,463	1,472	1,453	3,528	3,630	3,881	3,884

SOURCE: National Science Foundation, National Patterns of Science and Technology 1982, (NSF 82-319).

TABLE 1.4.2

POSTDOCTORATES IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD AND SOURCE OF SUPPORT: Fall 1975-80

Field	Total				Federal				Non-federal			
	1975	1977	1979	1980	1975	1977	1979	1980	1975	1977	1979	1980
Total	16,832	19,488	18,090	18,377	11,914	13,328	13,461	13,604	4,918	6,160	4,629	4,773
Engineering	1,170	1,245	1,071	979	815	932	772	689	355	313	299	290
Chemical	213	211	195	189	119	159	130	122	94	52	65	67
Physical Sciences	3,932	4,196	4,020	4,245	3,114	3,417	3,317	3,580	818	779	703	665
Chemistry	2,522	2,658	2,604	2,710	1,889	2,111	2,147	2,255	633	547	457	455
Physics	1,288	1,369	1,285	1,395	1,138	1,179	1,070	1,207	150	190	215	188
Environmental Sci.	292	376	315	307	222	307	253	252	70	69	62	55
Mathematical Sci.	167	145	200	205	70	91	102	90	97	54	98	115
Life Sciences	10,616	12,769	11,632	11,715	7,335	8,186	8,506	8,430	3,281	4,583	3,126	3,285
Psychology	367	399	452	473	217	240	280	301	150	159	172	172
Social Sciences	288	358	400	453	141	155	231	262	147	203	169	191

SOURCE: National Science Foundation: National Patterns of Science and Technology Resources 1982, (NSF 82-319).

TABLE 1.5.1

B.S. CHEMISTS WHOSE FIRST JOB WAS IN PRIVATE INDUSTRY
AS A PERCENT OF ALL WHO ACCEPTED FULL-TIME EMPLOYMENT, BY SEX: 1972-1982

Year	Men	Women	Both Sexes
1972	63.6	40.2	56.5
1973	78.3	60.0	73.0
1974	70.6	64.7	68.8
1975	67.3	59.3	64.5
1976	73.9	67.6	71.8
1977	74.9	66.9	72.0
1978	76.4	71.9	74.7
1979	73.0	60.5	68.2
1980	59.0	59.3	59.0
1981	92.6	93.5	93.0
1982	76.7	84.5	80.3

SOURCE: ACS Starting Salary Survey series.

TABLE 1.5.2

POST-GRADUATION PLANS OF CHEMISTRY AND CHEMICAL ENGINEERING B.S. GRADUATES: 1973-1982

Academic Year Ending	Total (1) Graduates	% Planning Full-time Study	% Full-time Employed (2)		
			Total	In Chem.	Not in Chem.
Chemistry:					
1973	10,128	na	35.7	25.2	10.5
1974	10,048	na	31.8	24.5	7.3
1975	10,059	na	29.5	22.6	6.9
1976	11,022	na	27.6	19.7	7.9
1977	11,215	60.5	30.2	22.3	7.9
1978	11,315	58.3	34.4	25.7	9.4
1979	11,509	54.7	36.8	27.7	9.1
1980	11,232	57.9	34.6	26.1	8.5
1981	11,347	55.1	36.0	27.0	9.0
1982[3]	11,400	56.1	32.7	24.0	8.7
Chemical Engineering:					
1973	3,578	na	69.0	61.9	7.1
1974	3,399	na	69.4	73.0	3.6
1975	3,070	na	71.1	65.4	5.7
1976	3,140	na	75.5	71.4	4.1
1977	3,524	20.0	76.5	72.1	4.4
1978	4,569	20.0	74.8	68.8	6.0
1979	5,563	17.3	79.5	71.6	7.9
1980	6,320	15.3	79.1	71.4	7.7
1981	6,527	14.3	79.2	69.2	10.4
1982[3]	6,620	16.2	63.1	52.2	10.9

SOURCE:
(1) National Center for Education Statistics, Earned Degrees Conferred series.
(2) ACS Starting Salary series.
(3) Estimates. See Table 1.2.1.

TABLE 1.5.3

POST-GRADUATION PLANS OF CHEMISTRY AND CHEMICAL ENGINEERING PH.D. GRADUATES
1973-1982

Academic Year Ending	Total (1) Graduates	% of Graduates Accepting Post-Docs. Appts.	% Full-time Employed (2)		
			Total	In Chem. or Chem. Eng.	Not in Chem. or Chem. Eng.
Chemistry:					
1973	1,872	40.4	51.5	49.1	2.4
1974	1,823	43.1	50.5	48.7	1.8
1975	1,822	47.5	48.1	46.1	2.1
1976	1,621	48.7	46.1	43.7	2.4
1977	1,563	42.7	53.6	50.5	3.1
1978	1,521	32.8	63.2	60.3	2.9
1979	1,516	23.6	59.1	55.5	3.6
1980	1,545	29.6	66.4	62.8	3.6
1981	1,622	28.8	69.3	65.9	3.4
1982[3]	1,670	30.7	66.1	62.9	3.2
Chemical engineering:					
1974	397	12.0	82.0	77.8	4.6
1974	400	4.4	94.4	94.4	0.0
1975	346	5.4	93.5	91.3	2.2
1976	308	12.9	85.9	85.9	0.0
1977	291	9.2	89.6	83.9	5.7
1978	259	6.2	93.8	89.2	4.6
1979	304	6.4	91.5	89.4	2.1
1980	284	0.0	94.7	94.7	0.0
1981	300	7.1	92.9	92.9	0.0
1982[3]	316	3.4	94.9	93.2	1.7

SOURCE:
(1) National Center for Education Statistics, Earned Degrees Conferred series.
(2) ACS Starting Salary series.
(3) Estimates. See Table 1.2.1.

TABLE 1.5.4

EMPLOYMENT STATUS AND ADVANCED STUDY PLANS OF B.S. CHEMISTS
by Certification Status: 1973 through 1982

Employment Status	1973		1974		1975		1976		1977	
	Cert.	Non-Cert	Cert.	Non-Cert	Cert.	Non-Cert	Cert.	Non-Cert.	Cert.	Non-Cert.
Full-time in Chemistry	29.7	20.1	26.1	22.9	24.7	20.6	21.7	17.9	25.0	20.2
Non-Chemistry	7.7	13.6	5.0	9.5	5.3	8.5	5.1	10.3	5.0	10.3
Assistantship Fellowship	(NA)	(NA)	38.3	18.1	42.8	19.5	42.7	22.1	42.4	20.1
Unemployed-Seeking	2.6	2.9	4.6	5.3	9.0	8.1	7.6	7.1	7.8	7.2
Not Seeking	3.7	2.5	12.1	22.5	18.1	43.4	23.0	42.5	19.8	42.3
No Response	2.6	2.9	14.0	21.6	--	--	--	--	--	--
Advanced Study										
Full-time[1]	--	--							60.2	60.6
Part-time	--	--	69.5	67.7	67.1	70.2	71.5	75.6	13.5	14.4
No plans	--	--	(NA)	(NA)	29.3	26.3	27.7	23.8	25.6	24.6
No Response	--	--	(NA)	(NA)	3.6	3.7	0.8	0.6	0.7	0.4

Employment Status	1978		1979		1980		1981		1982	
	Cert.	Non-Cert	Cert.	Non-Cert	Cert.	Non-Cert	Cert.	Non-Cert	Cert.	Non-Cert
Full time in Chemistry	28.5	21.5	30.4	24.8	29.6	20.4	26.3	26.1	26.7	19.5
Non-Chemistry	6.4	12.3	6.2	12.1	6.7	9.7	8.6	9.1	7.3	9.7
Assistantship Fellowship	37.9	20.6	33.2	13.5	35.7	17.7	27.9	14.3	33.3	15.9
Unemployed-Seeking	7.2	8.9	9.1	8.7	9.0	9.9	10.3	10.3	12.4	12.9
Not Seeking	20.0	36.6	21.1	40.9	16.6	36.2	24.6	36.6	18.0	38.3
No Response	--	--	--	--	2.4	6.1	2.2	3.6	2.2	3.7
Advanced Study										
Full-time	56.7	59.8	55.1	54.4	56.2	59.5	55.2	54.8	55.0	57.3
Part-time	16.3	14.5	12.6	15.2	13.4	11.5	14.0	16.3	11.7	11.1
No plans	26.6	25.1	32.3	30.4	29.8	28.2	29.7	27.5	31.5	28.9
No Response	0.4	0.6	--	--	0.6	0.7	1.1	1.5	1.8	2.7

1 The figures for 1974-76 represent full-time and part-time study plans combined.

SOURCE: ACS Starting Salaries series.

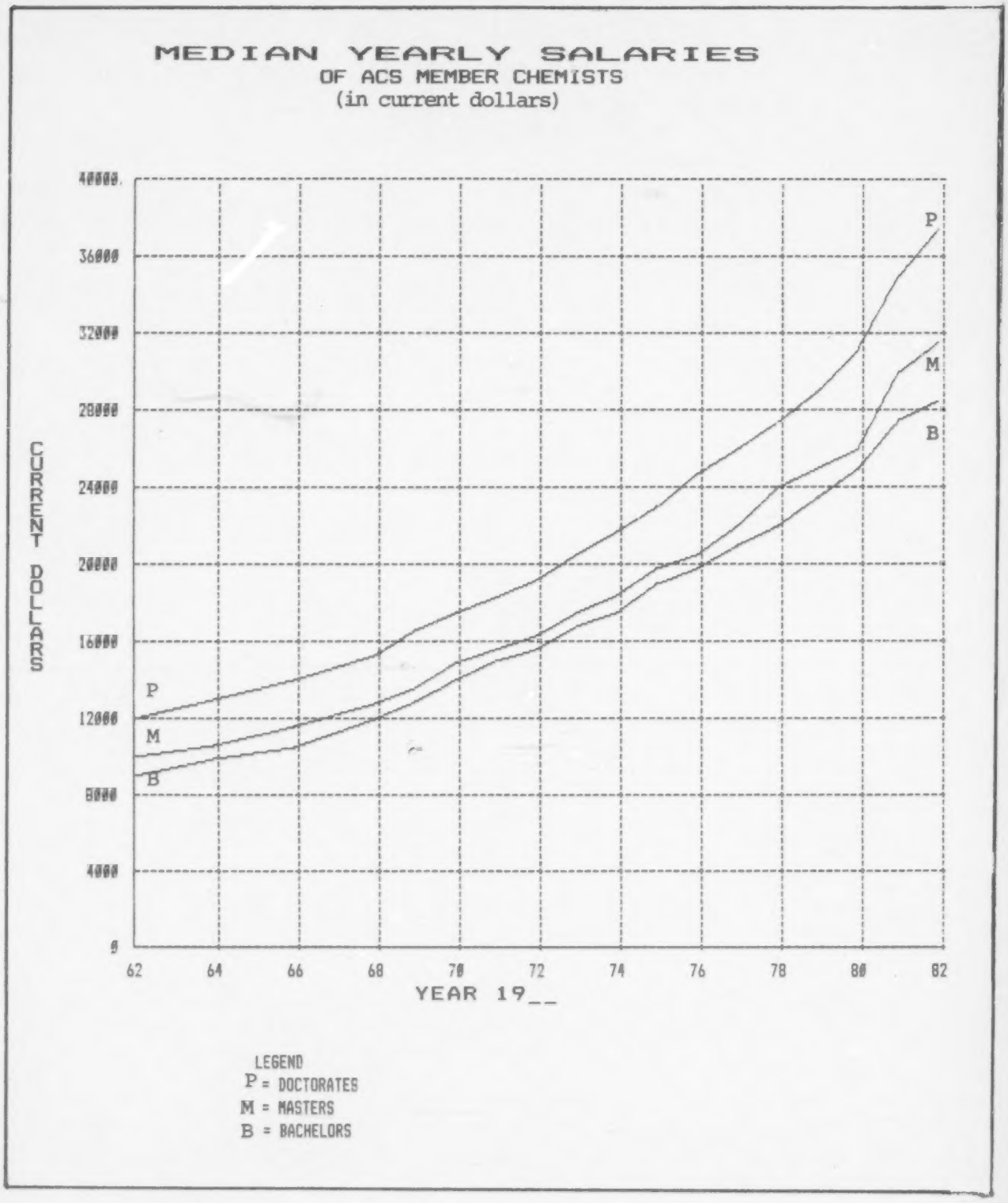
TABLE 1.5.5

FIELD OF ADVANCED FURTHER STUDIES OF B.S. CHEMISTS WHO PLAN FULL-TIME FURTHER STUDIES
by Certification Status: 1977 through 1982

STUDY	1977		1978		1979		1980		1981		1982	
	Cert.	Non-Cert.	Cert.	Non-Cert.	Cert.	Non-Cert.	Cert.	Non-Cert.	Cert.	Non-Cert.	Cert.	Non-Cert.
Chemistry	54.5%	18.1%	49.0%	15.9%	50.8%	17.3%	52.5%	18.3%	40.1%	15.5%	55.4	18.3
Other Physical	1.3	1.1	2.5	2.6	2.4	0.5	0.7	1.6	2.0	1.1	1.8	1.7
Chem. Engineering	4.1	2.6	3.1	2.3	5.4	2.9	4.4	3.9	5.3	3.8	5.5	2.8
Other Engineering	1.1	0.6	1.9	0.7	1.2	1.2	1.1	0.6	1.1	0.5	2.0	1.7
Biochemistry	8.4	5.2	7.3	5.5	7.1	2.9	5.5	3.3	5.9	4.6	4.7	5.1
Life Science	3.4	7.1	2.8	3.8	0.7	3.0	0.7	1.6	0.3	1.9	1.0	2.1
Medicine	20.9	46.3	23.5	49.9	20.9	49.0	19.5	47.8	30.3	46.6	19.1	48.3
Dentistry	1.8	11.2	3.1	9.5	2.7	11.4	3.1	8.2	5.0	12.0	2.0	8.6
Pharmacy	1.3	2.9	2.1	3.3	2.0	1.4	2.0	2.3	2.0	1.1	1.3	3.0
Business	1.1	1.2	2.0	3.2	1.5	1.6	2.2	2.1	1.7	2.2	2.0	1.9
Education	---	---	---	---	---	---	0.0	0.6	0.2	1.4	0.3	0.7
Law	1.1	2.0	1.5	1.6	1.0	1.4	0.7	2.3	1.2	0.5	0.5	1.4
Social Science	0.2	0.7	0.9	0.9	0.0	0.4	0.0	0.2	0.0	0.5	0.2	0.3
Other	0.6	0.9	0.3	0.9	4.4	7.0	5.8	6.6	4.1	7.4	2.2	3.5
No Response	---	---	0.1	0.0	---	---	1.8	0.6	0.8	0.8	1.8	0.5

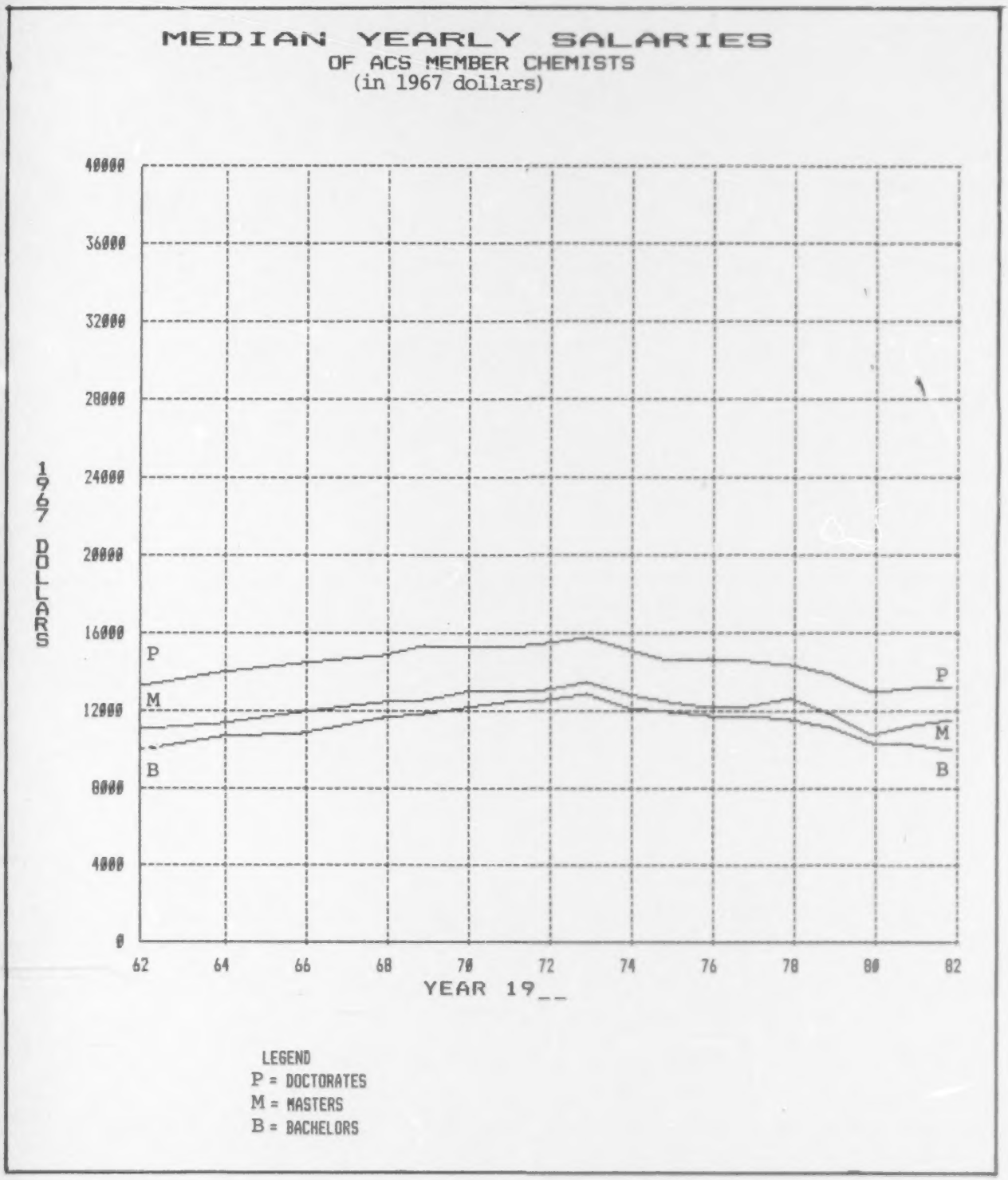
SOURCE: ACS Starting Salary series.

FIGURE 2.1



SOURCE: Table 2.1.1

FIGURE 2.2



SOURCE: Table 2.1.1

A METHOD FOR ESTIMATING AVERAGE SALARIES

Each year, in March, the ACS surveys its members, asking them to provide information on their salaries and on their employment characteristics. Results of these annual surveys are published in Chemical & Engineering News each June, and in a more detailed report published by the Office of Manpower Studies each July.

The traditional method for presenting the salary data from these surveys uses numerous tables, classified by type of employer, experience and degree level, and by other characteristics of the respondents.

A more compact method for presenting some of the salary data arises by observing that certain characteristics affect the salary figures in predictable ways. For example, among several groups of respondents, the group with the highest level of work experience generally has the highest average salary, when all other characteristics are held constant. Similarly, a group of respondents with advanced degrees generally has a higher average salary than a group of respondents with bachelor's degrees, (again with other characteristics such as experience and supervisory level held constant). These observations reflect the premium employees generally place on advanced degrees and on experience.

A more precise description of the relationships among the respondents' salaries and their employment characteristics is possible, through the use of a statistical technique known as multiple linear regression. The computational procedures for this technique are not detailed here. The accompanying tables present only the results of the analysis.

For industrial chemists responding to the 1982 survey, the three factors which account for most of the variation among salaries are degree, experience (years since the BS used in ACS surveys), and work function. Table I displays the factors needed to estimate the average salary for any group of respondents who are industrial chemists with any combination of the listed characteristics.

For example, to estimate the approximate average salary in March 1982 for industrial chemists with the doctorate, 15 to 19 years of maturity, and working in R&D management, find the corresponding factors in Table I and multiply them together with the base salary for all industrial chemists:

($20,809)x(1.264)x(1.539)x(1.184) = ($47,928)

Table II displays factors associated with salaries of academic chemists responding to the survey. To estimate the approximate average salary in March 1982 of associate professors at public colleges whose departments offer the doctorate, multiply the corresponding factors together with the base salary for all academic chemists:

($31,434)x(.768)x(1.000)x(1.175) = ($28,366)

Averages estimated using this method should be interpreted with caution, for two reasons. First, and most important, is that the relationship between salary and employment characteristics is not exact. Variations due to employer (such as size of company), or to individual differences (such as ability, or number of people supervised), and other measures prohibit perfect estimation of a group's (or individual's) average salary. Secondly, the factors shown in the tables are estimates derived from a sample of chemists rather than the entire population of chemists, and as such are subject to the imprecision associated with sampling procedures.

TABLE I

SALARY FACTORS FOR INDUSTRIAL CHEMISTS

BASE SALARY	$20,809
DEGREE:	
Bachelors's	1.000
Master's	1.052
Doctorate	1.264
MATURITY:	
(Years Since Receiving B.S.)	
0-1	1.000
2-4	1.043
5-9	1.230
10-14	1.378
15-19	1.539
20-24	1.697
25-29	1.823
30-34	1.833
35-39	1.854
40 or more	1.935
WORK FUNCTION:	
Basic Research	1.000
R&D Management	1.184
Applied Research	0.973
General Management	1.182
Marketing	1.071
Production	0.944
Forensic/Lab Analysis	0.918
Writing	0.852
Data Processing	0.867
Consulting	1.022
Other	0.963

TABLE II

SALARY FACTORS FOR ACADEMIC CHEMISTS

BASE SALARY	$31,437
RANK:	
Professor	1.000
Associate Professor	0.768
Assistant Professor	0.616
Instructor/Lecturer	0.678
Non-faculty Research Associate	0.649
Unranked Faculty Member	0.657
HIGHEST DEGREE OFFERED IN DEPARTMENT:	
Bachelor's or Master's	1.000
Doctorate	1.175
INSTITUTIONAL CONTROL:	
Public	1.000
Private	0.965

The Earnings Disparity Between Men and Women

One of the components of the disparity in earnings between men and women is work experience. Women average fewer years in the work force than do men, and aggregate averages that ignore experience tend to overestimate the disparity. The experience component can be removed, however, as the following analysis illustrates.

The 1982 survey of ACS members found that the mean annual salary for women BS chemists working in private industry that year was $24,568, while the mean for men was $33,554 (See Table 1). The simple ratio of these two means suggests that women in this group earned about 73% as much as their male counterparts. Notice, however, that almost half of the women fall into the first two experience[1] categories, while only about one sixth of the men fall into those two categories.

Table 1
Salaries of BS Chemists Employed Full-Time in Industry
by Sex and Years Since BS
1982 Survey of ACS Members

	Years Since BS										
SEX	0-1	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	>=40	All Levels
Men	$21,142	21954	26034	30745	34993	38059	40863	41925	48084	42155	33554 - Mean
	29	199	248	181	115	116	103	219	82	67	1359 - Count
Women	20,603	20820	24323	25607	34277	29787	32713	33942	45780	37245	24581
	27	113	72	27	18	14	7	8	5	3	294

What would the ratio of the two mean salaries be if the men and the women had the same distribution of experience? To answer this question, a "standard" experience distribution must be selected, and the aggregate means and their ratio recomputed[2].

Possible choices for the standard include

- the distribution for the entire sample
- the distribution for the group with the greatest representation in the sample
- the distribution for the population from which the sample was drawn.

The choice of standard does not substantially affect the ratio of the recomputed means. In practice, one of the first two choices is used, because the population distribution is generally not known.

To recompute the mean salary for women using the experience distribution for men in this sample, first multiply the mean salary for women in each experience group by the number of men in that group, then divide the sum of these products by the total number of men. That is,

$$\frac{(20603 \times 29) + (20820 \times 199) + ... + (37245 \times 67)}{1359} = \$29328$$

would be the mean salary for women if their distribution of experience were identical to the distribution for men.

The ratio of the recomputed women's mean salary to the mean's mean salary is

$$\frac{\$29328}{\$33554} = .87$$

indicating that nearly half of the disparity in the aggregate mean salaries ($33,554 for men, and $24,581 for women) is attributable to the difference in experience. The remaining half of the earnings disparity between the men and the women in this example may be due to other worker and job characteristics not used in this analysis, including, perhaps, sex-related discrimination in pay or advancement.

FOOTNOTES

1. This study used "Years since receiving the bachelors degree" as a measure of experience.

2. This is a common technique in the analysis of age-related demographic data. A specific example is found in the Monthly Labor Review, April 1982, in an article entitled "Tenure as a Factor in the Male-Female Earnings Gap", pages 32-34. (Published by the United States Department of Labor, Bureau of Labor Statistics.)

TABLE 2.1.1

MEDIAN YEARLY SALARIES OF ACS MEMBER CHEMISTS
By Degree: 1960 through 1982
(current and 1967 dollars in thousands)

Year	Current Dollars			Consumer Price Index for March	1967 Dollars		
	Degree Level				Degree Level		
	B.S.	M.S.	Ph.D.		B.S.	M.S.	Ph.D.
1960	$ 9.0	$ 9.0	$11.0	88.1	$10.2	$10.2	$12.5
1962	9.0	10.0	12.0	90.3	10.0	11.1	13.3
1964	9.9	10.6	13.0	92.6	10.7	11.4	14.0
1966	10.5	11.6	14.0	96.3	10.9	12.0	14.5
1968	12.0	12.8	15.3	102.8	11.7	12.5	14.9
1969	12.9	13.6	16.6	108.0	11.9	12.6	15.4
1970	14.0	14.9	17.5	114.5	12.2	13.0	15.3
1971	15.0	15.6	18.3	119.8	12.5	13.0	15.3
1972	15.6	16.3	19.2	124.0	12.6	13.1	15.5
1973	16.8	17.5	20.5	129.8	12.9	13.5	15.8
1974	17.5	18.4	21.7	143.1	12.2	12.9	15.2
1975	19.0	19.8	23.0	157.8	12.0	12.5	14.6
1976	19.8	20.5	24.7	167.5	11.8	12.2	14.7
1977	21.0	22.0	26.0	178.2	11.8	12.3	14.6
1978	22.0	24.0	27.4	189.7	11.6	12.7	14.4
1979	23.5	25.0	29.0	209.3	11.2	11.9	13.9
1980	25.0	26.0	31.2	239.8	10.4	10.8	13.0
1981	27.5	30.0	35.0	265.1	10.3	11.3	13.2
1982	28.5	31.6	37.5	283.1	10.0	11.6	13.2

SOURCES: ACS Comprehensive Salary Survey series.
U.S. Department of Commerce, Survey of Current Business.

TABLE 2.1.2

MEDIAN STARTING SALARIES OF B.S. INEXPERIENCED CHEMISTS IN PRIVATE INDUSTRY
by Sex: 1971 through 1982

Year	Men	Women	Women's Salaries As % of Men's
1971	8,300	7,800	94.0
1972	8,400	7,800	93.0
1973	9,000	8,500	94.0
1974	9,800	10,000	102.0
1975	10,000	9,600	96.0
1976	10,800	10,900	101.0
1977	12,000	12,000	100.0
1978	12,500	13,000	104.0
1979	15,000	15,600	104.0
1980	16,800	16,750	99.7
1981	17,000	18,500	108.8
1982	18,000	17,600	97.8

SOURCE: ACS Starting Salary Survey series.

TABLE 2.1.3

INDEX OF EARNINGS FOR NON-AGRICULTURAL EMPLOYEES AND FOR CHEMISTS: 1972-82

	Non-agricultural Employees			ACS Member Chemists			
	Average Hourly Earnings		Index of Wages in Constant $	Mean Annual Salary		Index of Salary in Constant $	Consumer Price Index for March
Year	In Current $	In 1967 $	1975=100	In Current $	In 1967 $	1975=100	
1972	3.59	2.895	103.1	18402	14840	104.9	1.240
1973	3.84	2.958	105.4	19711	15186	107.4	1.298
1974	4.12	2.879	102.6	20797	14533	102.6	1.431
1975	4.43	2.807	100.0	22320	14144	100.0	1.578
1976	4.76	2.842	101.2	23901	14269	100.9	1.675
1977	5.12	2.873	102.4	25561	14344	101.4	1.782
1978	5.54	2.920	104.0	27036	14252	100.8	1.897
1979	6.02	2.876	102.5	28934	13824	97.7	2.093
1980	6.51	2.715	96.7	30653	12783	90.4	2.398
1981	7.10	2.678	95.4	34531	13025	92.1	2.651
1982	7.75	2.737	97.5	36547	12909	91.3	2.831

Note: Average hourly earnings of production or non-supervisory workers on non-agricultural payrolls are based on "Current Labor Statistics" in the Monthly Labor Review, Bureau of Labor Statistics, July 1982.

Earnings for March of 1972 through 1982 are linear interpolations from annual data.

Chemists mean salaries are based on the annual salary survey of the ACS membership. The mean salaries for 1972 through 1974 are estimates based on published median salaries for those years and the 1975 ratios of mean salaries to mean salaries for each degree.

SOURCES: Bureau of Labor Statistics, Monthly Labor Review. American Chemical Society, Salaries series.

TABLE 2.1.4

SALARIES PAID NON-ACADEMIC PhD CHEMISTS COMPARED WITH A FAMILY BUDGET FOR SELECTED METROPOLITAN AREAS

Salaries of Full-time Non-academic ACS-member Doctoral Chemists, Selected ACS Local Sections		BLS Higher Budget (2) for a 4-person Family, Selected Metropolitan Areas		PhD Chemists Salary as Percent of Higher Budget
Local Section	Median Salary, March 1982 (based on standard weights) (1)	Metropolitan Area	Higher Budget for 4-person family Fall 1981	
Northeastern	$41,000	Boston	$44,821	91%
New York	40,450	New York &	47,230	86%
North Jersey	43,200	Northeastern New Jersey		91%
Philadelphia	40,050	Philadelphia	39,560	101%
Delaware	46,320			117%
Pittsburgh	44,000	Pittsburgh	36,714	120%
Washington, D. C.	42,400	Washington, D. C.	41,137	103%
Chicago	40,000	Chicago	37,368	107%
Southeastern Texas	41,000	Houston, TX	34,728	118%
Southern California (3)	42,000	Los Angeles & Long Beach	38,516	109%
		San Diego	37,722	111%
California	41,400	San Francisco	40,906	101%

SOURCE: U. S. Department of Labor, Bureau of Labor Statistics, Autummn 1981 Urban Family Budgets and Comparative Indexes for Selected Urban Areas.
ACS, Salaries 1982.

(1) Each hypothetical salary in this column is a weighted mean calculated by applying a standard weight to the mean salary within each experience level. The standard weights reflect the distribution of ACS member chemists in the U.S. In effect, the hypothetical mean for a local section is what the average salary would be if chemists in that geographic area had the same age distribution as does the country as a whole.

(2) The Bureau of Labor Statistics annually publishes several hypothetical budgets for families living in metropolitan areas. The family budgets considered here are for a precisely defined urban family of four: a 38 year-old husband employed full-time, his non-working wife, a boy of 13, and a girl of 8. After about 15 years of married life, the family is settled in the community and the husband is an experienced worker. The family has (for this budget level) average inventories of clothing, house furnishings, major durables (including an automobile), and other equipment. The budget pertains only to an urban family with the specified characteristics. These budgets are for a family whose income is somewhat more than average.

(3) The average salary shown for the California section is less than it should be. The error occurred because some respondents from the Southern California section were counted as belonging to the California section.

TABLE 2.1.5

COMPARISON OF AVERAGE ANNUAL SALARIES OF CHEMISTS IN PRIVATE INDUSTRY WITH SALARY RATES FOR FEDERAL CHEMISTS UNDER THE GENERAL SCHEDULE

Title	Average Salaries in Private Industry March 1982	Average GS Salaries, March 1982*	GS Grade	GS Salary Range (10 steps)
Chemist I	$ 19,640	$ 14,539	GS- 5	$ 12,854 - 16,706
Chemist II	23,474	18,007	GS- 7	15,922 - 20,701
Chemist III	28,016	21,811	GS- 9	19,477 - 25,318
Chemist IV	34,047	26,594	GS-11	23,566 - 30,640
Chemist V	40,207	32,065	GS-12	28,245 - 36,723
Chemist VI	46,971	38,571	GS-13	33,586 - 43,666
Chemist VII	53,658	45,713	GS-14	39,689 - 51,596

* Average of all GS employees (not limited to chemists) in each grade as of March 31, 1982.

SOURCE: National Survey of Professional, Administrative, Technical, and Clerical Pay, March 1982. U.S. Department of Labor, Bureau of Labor Statistics (Sept. 1982) Bulletin 2145.

TABLE 2.2:1

MEDIAN SALARIES OF NONSUPERVISORY SCIENTISTS AND ENGINEERS
by OCCUPATION and SELECTED YEARS SINCE FIRST DEGREE: 1981

	10 years since first degree			22-23 years since first degree		
	BS	MS	PhD	BS	MS	PhD
Agricultural Science	20,040	23,244	26,400	26,400	34,800	35,592
All Engineering	30,600	32,256	34,104	37,212	39,540	41,880
Chemical Engineering	28,944	31,392	34,800	36,600	39,396	43,596
Atmostpheric Science	27,600	24,900	31,200	38,400	32,400	35,400
Chemistry	24,600	24,900	31,200	32,196	25,344	37,416
Computer Science	29,736	29,304	35,700	34,200	36,000	33,000
Mathematics	27,360	27,300	31,200	36,600	39,144	45,000
Physics	29,796	29,700	30,600	36,300	39,696	39,660

SOURCE: Battelle Columbus Laboratories, 1981 National Survey of Compensation Paid Scientists and Engineers Engaged in Research and Development Activities.

TABLE 2.2.2

AVERAGE PAY FOR FACULTY MEMBERS AT PUBLIC COLLEGES AND UNIVERSITIES by Distribution and Rank: 1981-82

	Professor	Associate Professor	Assistant Professor	New Assistant Professor	Instructor	All Ranks
Biological sciences	$30,129	$24,378	$20,219	$18,418	$16,110	$25,591
Business and management	32,841	27,313	22,755	22,972	17,621	25,792
Communications	30,296	24,477	20,031	18,346	16,226	22,934
Computer and information sciences	31,846	27,063	22,713	22,454	17,867	24,840
Economics	31,215	25,790	21,219	20,971	17,471	25,256
Education	30,157	24,992	21,033	18,898	17,442	25,571
Special education	29,863	24,488	20,764	18,888	16,629	24,186
Vocational and technical education	30,289	24,713	20,895	19,862	16,982	23,949
Engineering	32,835	26,918	22,427	22,331	17,465	27,181
English	30,239	23,958	19,888	17,360	14,838	23,541
Fine and applied arts	29,519	23,795	19,630	18,101	16,542	23,394
Foreign languages	30,146	24,402	20,098	17,083	16,326	24,118
Geography	30,651	24,800	20,519	18,092	17,445	25,481
History	30,593	24,316	20,321	17,394	16,820	26,430
Home economics	30,503	24,377	20,610	18,614	16,358	22,244
Library science	30,112	24,136	20,041	18,798	15,918	22,037
Mathematics	30,561	25,018	20,765	19,627	15,574	24,434
Physical sciences	30,822	25,106	20,398	19,282	16,046	26,457
Psychology	31,015	24,556	19,905	18,729	16,306	25,438
Political sciences and government	30,944	24,614	19,839	18,402	16,940	25,271
Sociology	30,958	26,612	20,116	18,212	16,374	24,319
All disciplines	$30,739	$24,959	$20,708	$19,770	$16,500	24,870

SOURCE: American Association of State Colleges and Universities and College and University Personnel Association, as reported in The Chronicle of Higher Education, October 6, 1982. Reprinted with permission from The Chronicle of Higher Education, copyright 1982.

TABLE 2.2.3

Median Annual Salaries* of Full-Time Employed Doctoral Scientists and Engineers by Sex, Years Since Ph.D., and Field of Ph.D., 1981 (in thousands of dollars)

Sex and Years Since Ph.D.	All Fields	Field of Doctorate										
		Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL	$34.8	$31.8	$34.8	$36.9	$36.9	$34.9	$40.2	$33.1	$36.5	$32.5	$30.9	$30.9
5 or less	26.6	23.9	32.3	29.6	29.6	28.0	33.0	25.4	28.4	23.9	24.0	24.3
6-10	31.3	29.1	36.8	34.6	33.5	32.6	37.9	30.4	35.1	28.1	28.4	29.2
11-15	36.5	32.9		37.1	37.0	38.6	42.5	35.1	38.8	33.8	33.9	35.0
16-20	39.6	37.2			40.7	39.7	45.3	37.3	47.9	37.3	36.6	37.1
21-25	41.9	41.9		43.7	40.9		48.4	38.2	46.0	39.8	40.7	39.5
26-30	45.5			48.4	45.9		50.2	40.9		44.0	42.9	44.0
Over 30	46.6	47.2			47.5	50.3	50.3	42.0	50.1	46.0		44.9
Male, TOTAL	35.7	32.3	35.3	37.0	37.4	35.3	40.2	33.3	38.2	33.7	32.8	32.0
5 or less	27.5	23.9	32.5	29.8	29.8	28.0	33.1	25.6	29.5	24.2	24.6	24.7
6-10	32.1	29.2	36.9	34.7	33.9	32.9	37.9	30.4	36.0	28.9	29.4	29.5
11-15	36.9	33.2		37.3	37.3	38.7	42.5	35.2	39.4	34.6	34.4	35.6
16-20	40.1	37.5			41.1	39.7	45.3	37.5	48.6	38.7	36.9	37.2
21-25	42.2	42.1		43.9	41.8		48.4	38.2		40.1	40.8	39.7
26-30	45.8			48.5	46.2		50.2	41.0		44.5	43.7	44.5
Over 30	47.5	47.8		47.4			50.3	42.0		46.9		
Female, TOTAL	27.1	27.0	30.8	30.8	29.5	29.4	32.8	24.9	30.1	26.6	26.1	26.0
5 or less	23.6	23.7	29.8	28.2	28.0	26.3	31.1	23.6	27.1	21.8	23.0	23.2
6-10	26.8	26.2		30.6	28.9	29.1	35.1	26.5	29.8	25.9	26.4	26.9
11-15	30.3	29.2		30.3	29.5	30.3	36.1		35.6	28.6	31.0	31.3
16-20	33.1				31.3				38.2	30.4	34.8	35.3
21-25	34.5				33.2					35.0		34.5
26-30	36.8									35.4		35.3
Over 30	35.6											

*Median salaries were computed only for Ph.D.s employed full-time, excluding those in the U.S. military. Academic salaries were multiplied by 11/9 to adjust for a full-year scale. Medians were not reported for cells with less than 20 cases reporting salary or with a sampling error of more than ± $2,000.

SOURCE: National Research Council, Science, Engineering, and Humanities Doctorates in the United States 1981 Profile.

TABLE 2.2.4

PERCENT INCREASE IN AVERAGE SALARIES FOR SELECTED OCCUPATIONS IN PRIVATE INDUSTRY:
1971-1972 through 1981-1982

OCCUPATIONAL GROUP	YEAR 1971-1972	1972-1973	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	AVERAGE ANNUAL CHANGE 1972-1982 SALARY	BUYING POWER
Accountants	5.6	4.9	6.1	9.8	6.4	7.8	8.3	8.0	9.2	10.0	9.6	8.0	-0.4
Auditors	5.5	5.2	5.2	6.8	5.5	6.8	8.2	6.5	8.8	10.3	9.4	7.2	-1.2
Chief Accountants	3.9	5.8	7.2	8.6	6.6	10.5	8.0	7.7	11.3	9.5	11.4	8.6	+0.2
Attorneys	6.1	6.3	5.8	7.6	6.1	5.4	9.1	8.9	9.3	9.8	11.4	7.9	-0.5
Buyers	6.3	5.0	6.0	9.2	6.7	7.0	7.8	7.0	8.1	9.8	9.4	7.6	-0.8
Job Analysts	6.8	5.2	6.1	7.5	6.0	6.5	7.2	8.6	8.1	7.6	9.2	7.2	-1.2
Personnel Directors	3.9	7.5	7.2	6.1	7.8	9.1	10.0	7.5	11.2	11.4	9.6	7.9	-0.5
Chemists	5.1	3.7	7.1	10.1	6.6	7.0	9.0	7.6	9.8	9.4	10.4	8.0	-0.4
Engineers	5.2	5.1	5.4	8.4	6.8	6.4	9.0	8.4	9.8	10.9	10.2	8.0	-0.4
Engineering Technician	5.1	4.7	6.0	9.0	8.1	7.2	7.1	7.6	11.0	10.2	9.4	8.0	-0.4
Drafters	7.2	6.2	6.7	8.0	7.4	6.0	7.1	(NA)	11.8	10.2	8.4	8.0	-0.4
Clerical	6.1	5.4	6.4	9.6	7.3	6.6	7.4	7.8	8.3	-	-	-	-
Unweighted Mean	5.5	5.4	6.3	8.4	6.8	7.2	8.2	7.8	9.7	9.9	9.8	7.8	

SOURCE: U. S. Bureau of Labor Statistics, National Survey of Professional, Administrative, Technical, and Clerical Pay, March, 1982.

TABLE 2.2.5

AVERAGE ANNUAL PERCENT INCREASE IN AVERAGE NET INCOME FROM MEDICAL PRACTICE: 1970-81

	YEAR										
	1970 to 1971	1971 to 1972	1972 to 1973	1973 to 1974	1974 to 1975	1975* to 1976	1976* to 1977	1977 to 1978	1978* to 1979	1979 to 1981	1970 to 1981
PERCENT	8.4	4.2	3.0	7.0	8.5	5.5	2.9	7.0	4.7	4.4[1]	5.1

*Income for 1976 and 1978 was projected by respondents.

1. The average annual increase from 1979 to 1981 is based on net income for 1981 reported in the American Medical Association, Socioeconomic Monitoring System, June, 1982.

SOURCE: Profile of Medical Practice 1979, Periodic Survey of Physicians, 1970-79, Center for Health Services Research and Development, American Medical Association. The 1981 income figure is from the AMA, Socioeconomic Monitoring System, June 1982

TABLE 2.2.6

NUMBER and AVERAGE STARTING SALARY OFFERS TO INEXPERIENCED B.S. GRADUATES
by Curriculum: July 1981 and July 1982

	Number of Offers		Average $ Offers		Percent Change in $ Offers
	July 1982	July 1981	July 1982	July 1981	from July 1981
Curriculum					
Chemical Engineering	3,986	7,428	27,072	24,360	11.1
Chemistry	262	409	21,012	19,644	7.0
Other Physical and Earth Sciences	461	703	23,760	22,152	7.3

SOURCE: The College Placement Council, "CPC Salary Survey: A Study of 1981-82 Beginning Offers," No.3, July 1982. Printed with permission from the College Placement Council copyright 1982.

TABLE 2.2.7

SALARIES IN SELECTED PROFESSIONS

Salaries Paid to Scientists and Engineers in R&D 1981[1]

	Median	Mean	Adjusted Mean*
Agricultural & Biological Scientists	$25,256	$26,307	
Chemical Engineers	31,872	33,264	$34,260
Chemists	29,148	30,216	30,216
Computer Scientists	28,037	29,010	
Economists	29,131	30,549	
Engineers	31,068	32,592	35,412
Mathematicians	32,252	32,587	
Physicists	34,704	35,064	34,368

Salaries of Faculty Members by Field 1980-81[2]

Arts, Fine and Applied		21,942
Business and Economics		24,924
Engineering and Computer Science		26,601
Humanities, Language, Literature and Communications		22,847
Physical Education		20,850
Science and Mathematics		24,451
Social Sciences		24,377
Vocational Education, Home Economics, Nursing and Health		20,596

Net Income of Dentists 1979[3]

Dentists	42,000	46,747

Physicians Income from Private Practice 1981[4]

Physicians	93,000

* To allow comparison among disciplines, salaries for disciplines other than chemistry are adjusted in consideration of differences in the distribution among degree levels.

(1) Battelle Columbus Labs, 1981 National Survey of Compensation Paid Scientists and Engineers Engaged in Research and Development Activities, December, 1981.

(2) The Chronicle of Higher Education, November 3, 1980 and John Minter Associates, Faculty Salaries 1980-1981 and Additional Earnings 1979-1980 as in SALARIES of Scientists, Engineers and Technicians prepared by the Scientific Manpower Commission, November. 1981. Salaries are reported for the 1980-1981 academic year.

(3) American Dental Association, The 1979 Survey of Dental Practice. Data was compiled in 1978 and represents net income from dentistry for all dentists.

(4) American Medical Association, Socioeconomic Monitoring System, Vol. 1, No. 5, June, 1982. Includes physicians in general, internal, surgical, ped., ob./gyn., rad., psych., and anes. practice.

TABLE 2.2.8

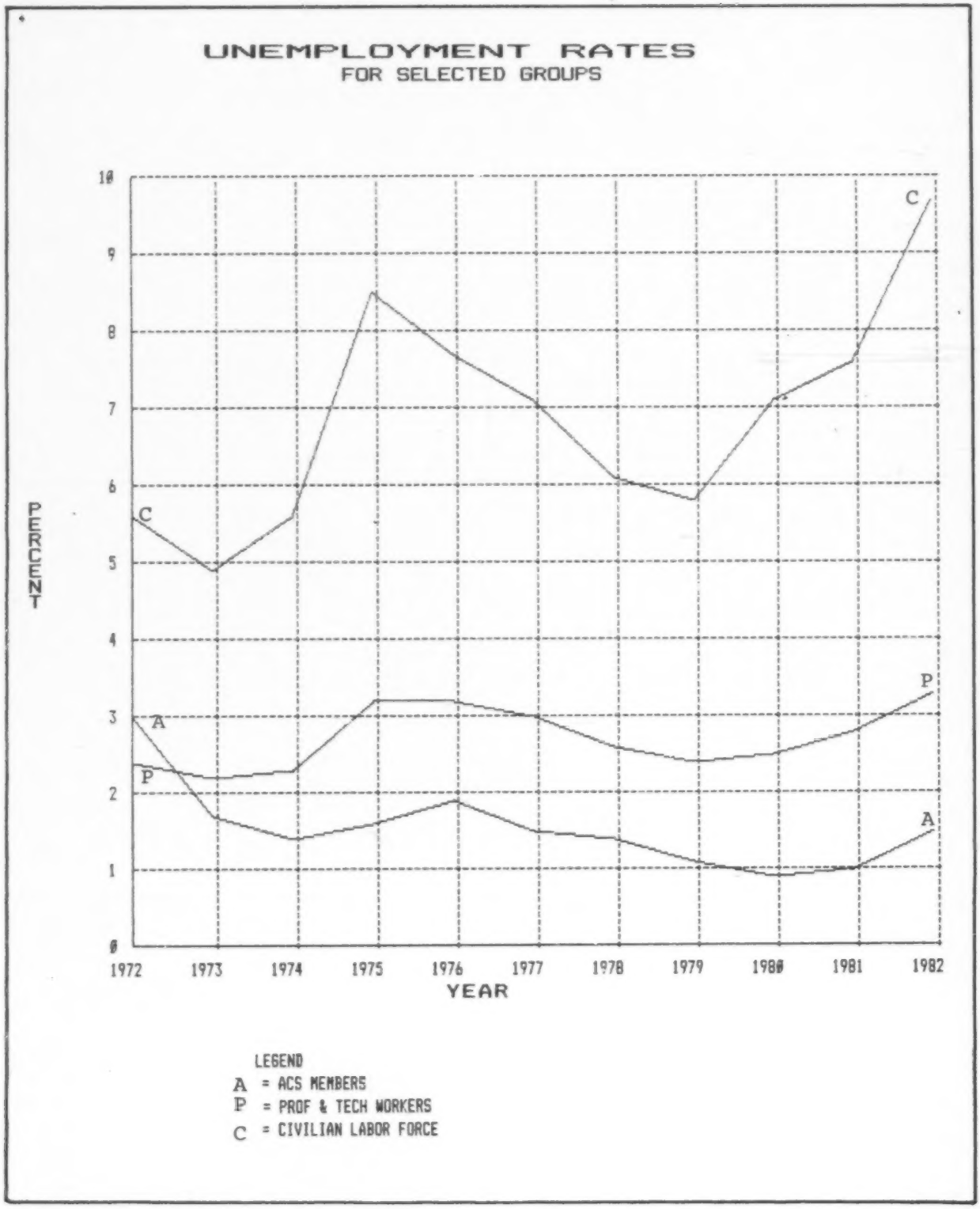
AVERAGE 1981-82 NET STIPENDS OF TEACHING ASSISTANTS by DEPARTMENT
Data from 1,093 Departments at 25 Universities

Department	Net [1]	Department	Net [1]
Engineering mechanics	$5,661	Animal science	4,330
Agricultural economics	5,659	Nutrition	4,322
Agricultural engineering	5,361	Sociology	4,241
Physics and astronomy	5,039	Communications	4,240
Spanish	4,944	German	4,225
Computer science	4,889	Economics	4,206
Chemical engineering	4,843	Slavic languages	4,204
Chemistry	4,836	Business	4,187
Mechanical engineering	4,831	Geology	4,169
Zoology	4,809	Business administration	4,147
Electrical engineering	4,806	Political science	4,146
French	4,806	Philosophy	4,130
Industrial engineering	4,774	Romance languages	4,103
Entomology	4,772	History of art	4,096
Horticulture	4,765	Linguistics	4,091
Mathematics	4,757	Social work	4,076
Forestry	4,718	Classics	4,061
Botany	4,708	History	4,052
Food and nutrition	4,684	Psychology	4,041
Physics	4,670	Curriculum and instruction	4,014
Agronomy	4,653	Nuclear engineering	3,881
Physiology	4,642	Architecture	3,787
Biochemistry	4,639	Biology	3,737
Astronomy	4,624	Education	3,735
Civil engineering	4,613	Art	3,730
Plant pathology	4,570	Health, physical education and recreation	3,712
Statistics	4,531	Anthropology	3,592
Landscape architecture	4,516	Pharmacy	3,586
English	4,468	Music	3,430
Aerospace engineering	4,433	Theater	3,383
Geography	4,433	Anatomy	3,356
Microbiology	4,372	Nursing	3,194
Journalism	4,351		

1. Average stipend minus required tuition and fees paid by students.

SOURCE: Henry F. Holtzclaw, Jr., and Russell C. Nelson, University of Nebraska, Lincoln, as reported in The Chronicle of Higher Education, October 13, 1982. Reprinted with permission from The Chronicle of Higher Education copyright 1982.

FIGURE 3.1



SOURCE: Table 3.6.1

TABLE 3.1.1

SCIENTISTS AND ENGINEERS IN THE LABOR FORCE
by Field, Sex and Employment Status: 1978

	Total		In S/E		Outside S/E		Unemployed/ Seeking	
	Men	Women	Men	Women	Men	Women	Men	Women
FIELD								
Chemistry	131,400	12,300	117,100	8,700	14,300	3,700	2,000	900
Mathematics	70,900	17,500	38,100	4,800	32,700	12,800	900	500
Environmental Sci.	64,600	7,700	57,500	5,000	7,100	2,700	1,600	100
Engineering	1,248,500	19,800	1,183,400	17,800	65,100	2,100	16,000	700
Life Science	227,800	63,200	165,600	36,200	62,100	26,900	3,800	1,200
Psychology	89,700	31,200	58,200	13,100	31,500	18,200	1,400	900
Social Science	149,500	36,400	89,000	7,200	60,500	29,300	1,100	1,400

SOURCE: National Science Foundation, Women and Minorities in Science and Engineering, January 1982.

TABLE 3.1.2

SCIENTISTS AND ENGINEERS IN THE LABOR FORCE
by Field, Race and Employment Status
1978

	Total Employed					Unemployed, Seeking				
Field	Total	White	Black	Asian	Other[1]	Total	White	Black	Asian	Other[1]
Chemistry	143,800	136,200	3,000	3,400	1,100	2,900	2,800	100	(2)	(2)
Mathematics	88,400	82,600	2,900	1,800	1,200	1,400	1,300	(2)	(2)	(2)
Environmental Sci.	72,200	70,600	700	600	400	1,700	1,600	(2)	(2)	100
Engineering	1,268,400	1,217,900	10,600	26,400	13,500	16,600	16,500	(2)	(2)	100
Life Science	291,000	278,200	6,600	4,600	1,400	4,900	4,200	(2)	600	200
Psychology	120,000	117,000	3,000	(2)	700	2,300	2,000	200	(2)	(2)
Social Science	186,000	166,300	10,600	5,100	4,000	2,500	2,400	100	(2)	(2)

1 Includes American Indians, "Other," and "No Report."
2 Too few cases to estimate.

SOURCE: National Science Foundation, Women and Minorities in Science and Engineering January, 1982.

TABLE 3.2.1

DOCTORAL SCIENTISTS AND ENGINEERS IN THE LABOR FORCE
by Field, Race and Labor Force Status: 1979

FIELD AND RACE	LABOR FORCE STATUS			
	Total	Labor Force	Total Employed	Outside Labor Force
Chemistry	42,700	40,000	39,600	2,500
White	37,600	35,100	34,800	2,400
Black	400	400	400	(2)
Asian	3,200	3,100	3,100	100
Other	1,400	1,400	1,300	100
Mathematics	16,100	15,400	15,300	700
White	13,900	13,300	13,200	600
Black	200	200	200	(2)
Asian	1,000	900	900	(2)
Other	1,000	900	900	(2)
Environmental Science	15,100	14,700	14,600	400
White	14,000	13,600	13,600	400
Black	100	100	100	(2)
Asian	400	500	500	(2)
Other	500	500	500	(2)
Engineering	51,500	50,500	50,200	1,000
White	42,100	41,200	41,000	800
Black	200	200	200	(2)
Asian	7,700	7,600	7,500	100
Other	1,600	1,500	1,500	100
Life Science	86,300	81,000	80,100	5,200
White	77,000	72,200	71,500	4,600
Black	1,000	900	900	100
Asian	5,100	4,900	4,900	100
Other	3,200	2,900	2,800	300
Psychology	40,300	38,400	38,000	1,700
White	37,200	35,500	35,100	1,500
Black	600	600	600	(2)
Asian	400	400	400	(2)
Other	2,000	1,900	1,900	100
Social Science	52,000	49,200	48,600	2,600
White	46,400	43,800	43,400	2,400
Black	1,100	1,000	1,000	(2)
Asian	2,100	2,100	2,000	(2)
Other	2,400	2,200	2,200	100

1 Includes American Indians and "No Report".
2 Too few cases to estimate.

SOURCE: National Science Foundation, Women and Minorities in Science and Engineering, January 1982.

TABLE 3.2.2

Employment Status of Doctoral Scientists and Engineers by Field of Ph.D., 1981
(1938-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	358,600	19,000	2,200	29,200	48,000	12,400	52,900	16,500	11,100	64,800	47,400	55,100
Employed Full-Time	88.5	92.5	97.1	91.8	87.9	90.3	95.4	89.4	85.3	80.5	86.6	90.0
Employed Part-Time	2.9	1.7	1.4	1.3	2.2	4.0	1.7	1.1	2.8	2.9	6.7	2.9
Postdoctoral Appointment+	2.9	1.0	1.2	3.1	3.0	1.5	0.4	0.9	6.4	8.5	1.7	0.7
Not Employed	5.3	4.6	0.2	3.6	6.5	3.8	2.2	7.9	5.1	7.6	4.6	5.5
[redacted]												
No Report	0.4	0.2	0.1	0.2	0.4	0.4	0.2	0.6	0.4	0.5	0.4	0.5

+The percentage of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.
#Percentages are not unemployment rates because they are calculated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 1.9 and 1.10.
*Less than 0.1 percent.

Employment Status of Doctoral Scientists and Engineers by Field of Ph.D., 1981
(1975-1980 Graduates)

1981 Employment Status	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Total Population (N)	97,800	4,500	1,300	6,000	8,900	3,900	12,300	3,800	3,800	18,200	17,100	18,000
Employed Full-Time	84.5	93.6	95.8	83.0	83.0	90.0	97.4	94.3	76.8	63.6	85.4	92.5
Employed Part-Time	2.7	1.3	2.0	1.0	0.8	3.9	0.1	0.6	2.0	2.4	7.1	3.1
Postdoctoral Appointment+	9.7	2.6	1.9	13.3	13.8	4.3	1.4	3.2	17.5	28.5	4.6	1.2
Not Employed	2.8	2.4	0.2	2.3	2.4	1.7	0.5	1.2	3.6	5.3	2.5	3.1
[redacted]												
No Report	0.3	0.1	0.0	0.4	*	0.2	0.6	0.8	0.0	0.2	0.5	0.1

+The percentage of postdoctoral appointees may be underestimated because information about foreign Ph.D.s who came to the U.S. for postdoctoral research or study is incomplete.
#Percentages are not unemployment rates because they are calculated on the total population, which includes those retired, those not seeking employment, and those not reporting status, none of whom are part of the labor force. For unemployment rates, see Tables 1.9 and 1.10.
*Less than 0.1 percent.

SOURCE: National Research Council, Science, Engineering and Humanities Doctorates in the United States 1981 Profile.

TABLE 3.2.3

Employment and Unemployment of Doctoral Scientists and Engineers in the U.S. Labor Force by Sex and Field of Ph.D., 1981

1981 Labor Force Status/Sex	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
TOTAL Ph.D. Labor Force*	340,900	18,200	2,200	28,300	45,000	11,900	51,600	15,100	10,600	60,500	45,500	52,000
Employed Full-Time	93.1	96.6	97.2	94.9	93.7	93.6	97.7	97.4	89.6	86.3	90.2	95.4
Employed Part-Time	3.0	1.8	1.4	1.3	2.4	4.1	1.8	1.2	2.9	3.1	6.9	3.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	3.1	1.0	1.2	3.2	3.2	1.5	0.4	1.0	6.7	9.1	1.8	0.7
Unemployed and Seeking Employ	0.8	0.5	0.2	0.6	0.7	0.8	0.1	0.4	0.7	1.5	1.1	0.8
Ph.D. Labor Force,* Male	300,100	16,700	2,000	27,500	41,800	11,300	51,100	14,700	8,800	49,500	33,300	43,400
Employed Full-Time	94.9	97.2	97.4	95.2	94.6	94.2	97.8	97.8	91.5	89.6	93.7	97.1
Employed Part-Time	2.0	1.3	1.3	1.1	1.9	3.7	1.7	1.0	2.1	1.8	3.6	2.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	2.6	1.0	1.3	3.2	2.9	1.3	0.4	0.8	6.1	7.6	1.7	0.4
Unemployed and Seeking Employ	0.6	0.5	0.1	0.5	0.6	0.7	0.1	0.4	0.3	1.0	1.0	0.3
Ph.D. Labor Force,* Female	40,800	1,500	200	800	3,200	600	500	400	1,800	11,000	12,200	8,600
Employed Full-Time	80.1	90.2	94.9	84.4	81.2	81.6	89.7	83.0	80.3	71.5	80.8	86.6
Employed Part-Time	10.7	7.7	3.4	9.4	9.3	11.4	7.9	7.1	7.0	8.8	16.0	8.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Postdoctoral Appointment	6.7	0.9	0.0	4.4	7.4	5.3	1.6	8.4	9.9	16.0	2.0	2.3
Unemployed and Seeking Employ	2.4	1.2	1.7	1.8	2.1	1.7	0.8	1.5	2.8	3.7	1.2	3.1

*Includes full-time and part-time employed, postdoctoral appointees, and those unemployed and seeking employment.

SOURCE: National Research Council, Science, Engineering and Humanities Doctorates in the United States 1981 Profile.

TABLE 3.2.4

Type of Employer of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1938-1980 Graduates)

1981 Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population+ (N)	327,800	17,900	2,100	27,200	43,200	11,700	51,400	15,000	9,800	54,000	44,300	51,200
Educational Institution	53.4	73.7	40.9	49.1	34.2	46.7	33.9	58.6	58.0	65.3	50.2	74.0
4-Year Coll/Univ/Med Sch.	51.2	71.5	40.7	47.9	31.8	45.2	33.6	57.5	57.4	65.2	49.4	71.8
2-Year College	1.4	1.6	0.2	0.9	1.9	1.2	*	0.9	0.5	1.9	2.2	1.9
Elem/Secondary School	0.8	0.6	0.0	0.3	0.4	0.3	*	0.1	0.1	0.3	3.6	0.4
Business/Industry#	29.8	17.8	49.7	33.9	56.3	28.1	53.7	20.6	22.0	15.7	23.6	9.7
U.S. Government	8.0	5.8	7.2	11.0	5.6	17.9	7.4	15.3	8.0	9.6	3.7	7.3
State/Local Government	1.9	0.2	0.0	0.3	0.7	3.5	0.7	2.4	2.7	1.8	4.5	2.6
Hospital/Clinic	2.9	0.2	0.0	1.1	0.8	0.1	0.1	0.2	5.9	3.3	13.9	0.3
Other Non-Profit Organization	3.2	1.8	2.2	4.6	2.3	3.0	3.8	1.9	2.3	2.8	3.5	3.7
Other	0.7	0.2	0.0	*	0.1	0.4	0.4	0.8	0.8	1.2	0.5	1.8
No Report	0.2	0.3	0.0	0.1	*	0.3	0.1	0.2	0.3	0.2	0.1	0.5

+Excluded from this table are 30,800 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
#Includes self-employed.
*Less than 0.1 percent.

Type of Employer of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1975-1980 Graduates)

1981 Type of Employer	All Fields	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population+ (N)	85,300	4,300	1,300	5,000	7,400	3,700	12,000	3,600	3,000	12,000	15,800	17,200
Educational Institution	49.6	69.2	41.8	38.6	22.2	41.2	28.6	55.7	59.5	62.3	46.2	68.0
4-Year Coll/Univ/Med Sch.	46.7	65.2	41.7	37.3	20.6	40.3	28.6	54.6	58.5	59.3	44.7	65.5
2-Year College	1.7	2.5	0.1	1.3	1.2	0.9	0.0	1.1	1.0	2.5	1.6	2.5
Elem/Secondary School	1.2	1.5	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.3	0.8	0.1
Business/Industry#	30.7	21.5	51.1	42.8	68.1	34.0	60.5	26.0	17.5	18.1	20.9	11.2
U.S. Government	7.6	6.2	5.9	10.4	4.2	16.9	4.8	11.4	9.5	10.2	3.8	9.1
State/Local Government	2.6	0.2	0.0	0.1	1.4	3.5	1.0	2.6	2.8	2.0	5.2	3.9
Hospital/Clinic	4.6	0.7	0.0	1.5	1.0	0.0	*	0.2	5.9	3.2	19.6	0.6
Other Non-Profit Organization	4.0	2.2	1.2	6.2	3.1	4.2	5.0	3.6	3.1	2.4	3.7	5.1
Other	0.8	0.0	0.0	0.0	*	0.2	0.1	0.0	1.6	1.7	0.5	2.0
No Report	0.1	*	0.0	0.3	0.1	0.0	*	0.5	0.1	0.1	0.2	0.2

+Excluded from this table are 12,500 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
#Includes self-employed.
*Less than 0.1 percent.

SOURCE: National Research Council, Science,Engineering and Humanities Doctorates in the United States 1981 Profile.

TABLE 3.2.5

Primary Work Activity of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1938-1980 Graduates)

	All Fields	Field of Doctorate										
		Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	327,800	17,900	2,100	27,200	43,200	11,700	51,400	15,000	9,800	54,000	44,300	51,200
Teaching	31.4	54.8	22.4	23.8	21.6	28.0	20.3	20.3	25.6	30.6	28.3	55.[illegible]
Research/Dvlp/Design	33.6	24.9	51.4	49.4	41.7	40.0	41.5	42.0	35.0	43.8	14.0	14.5
Management/Admin	18.1	10.6	16.7	18.9	24.1	17.3	24.9	20.1	20.2	13.4	14.9	15.4
of R&D	9.9	3.6	9.8	13.4	16.1	11.1	16.3	10.6	10.8	7.5	3.6	4.3
of Educ. Programs	4.1	5.1	4.7	2.5	1.9	1.6	3.4	5.3	5.5	3.4	5.4	6.8
of Other Activities	4.1	1.8	2.2	3.0	4.1	4.6	5.2	4.2	4.0	2.5	5.9	4.3
Consulting/Prof. Svcs	10.4	5.2	8.6	3.6	4.6	8.2	8.2	5.7	13.0	6.0	38.0	5.0
Writing/Editing	1.0	0.5	0.1	0.7	0.7	1.4	0.6	0.9	0.7	0.8	0.8	2.2
Mktg/Prod/Insp	1.9	1.0	0.6	1.1	4.0	1.2	2.5	4.2	1.1	1.8	0.4	1.3
Other	2.6	2.1	0.1	1.5	2.3	2.8	1.7	4.7	3.2	2.3	2.5	4.0
No Report	1.2	0.8	0.0	1.0	0.9	1.0	0.4	2.2	1.1	1.4	1.2	2.0

[+]Excluded from this table are 30,800 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.

Primary Work Activity of Full-Time and Part-Time Employed Doctoral Scientists and Engineers by Field of Ph.D., 1981 (1975-1980 Graduates)

	All Fields	Field of Doctorate										
		Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
Employed Population[+] (N)	85,300	4,300	1,300	5,000	7,400	3,700	12,000	3,600	3,000	12,000	15,800	17,200
Teaching	28.7	52.1	23.8	13.4	12.8	20.4	18.6	20.8	25.6	27.1	22.1	53.1
Research/Dvlp/Design	41.2	31.4	56.5	68.9	69.6	53.1	58.1	49.4	43.8	55.6	15.9	19.0
Management/Admin	10.4	5.1	11.3	8.2	8.5	12.7	12.8	10.9	14.8	6.6	11.2	11.8
of R&D	5.7	3.3	5.2	7.1	7.1	9.2	10.8	6.5	7.5	4.3	2.9	4.0
of Educ. Programs	1.9	1.2	4.3	0.1	0.1	0.1	0.4	1.5	4.2	0.9	[illegible]	[illegible]
of Other Activities	2.8	0.7	1.0	1.0	1.3	3.5	1.8	2.9	3.1	1.4	[illegible]	[illegible]
Consulting/Prof. Svcs	12.8	6.3	8.2	2.8	1.7	6.5	7.3	5.0	9.8	4.5	45.3	6.0
Writing/Editing	1.0	0.8	0.0	1.9	1.0	1.6	0.8	0.6	0.5	1.1	0.5	1.5
Mktg/Prod/Insp	2.0	*	0.2	2.2	4.5	0.7	1.6	4.6	1.1	2.8	0.5	2.5
Other	2.9	3.5	0.0	1.5	1.4	4.8	0.8	6.0	4.0	1.5	3.3	5.0
No Report	0.9	0.7	0.0	1.1	0.6	0.2	*	2.6	0.5	0.8	1.3	1.1

[+]Excluded from the table are 12,500 Ph.D.s who were postdoctoral appointees, were not employed, or did not report employment status.
*Less than 0.1 percent.

SOURCE: National Research Council, Science, Engineering and Humanities Doctorates in the United States 1981 Profile.

TABLE 3.3.1

Field Mobility of Employed Doctoral Scientists and Engineers, 1981

1981 Field of Employment	Total Employed[+]	Field of Doctorate: Math	Comp Sci	Phys/ Astrn	Chem	Earth/ Envir	Engr	Agric	Med	Biol	Psych	Social Sci
All Fields (N)	338,300	18,100	2,200	28,100	44,700	11,800	51,600	15,100	10,500	59,500	45,100	51,600
Mathematics	13,900	[redacted]	1.9	0.8	*	0.2	0.5	0.2	0.0	0.3	0.1	0.5
Computer Sciences	8,300	9.6	[redacted]	4.7	1.0	0.1	3.4	0.5	0.1	0.4	1.2	0.7
Physics/Astronomy	19,000	0.3	0.0	[redacted]	1.3	0.7	1.7	*	0.1	0.1	0.0	0.1
Chemistry	35,300	0.0	0.0	1.0	[redacted]	0.6	0.9	1.3	1.2	1.9	0.0	0.1
Earth/Envir. Sciences	15,200	0.7	0.0	4.1	2.2	[redacted]	1.9	1.7	0.3	2.0	0.1	0.6
Engineering	52,900	5.3	10.0	17.0	5.9	3.9	[redacted]	0.4	0.3	1.0	0.6	0.6
Agricultural Sciences	14,700	0.2	0.0	0.1	0.2	0.9	0.2	[redacted]	0.3	3.6	0.0	0.8
Medical Sciences	20,400	0.6	0.6	1.3	3.5	0.3	0.6	1.5	[redacted]	11.8	2.6	1.5
Biological Sciences	49,600	2.8	0.0	1.6	4.0	1.6	0.6	7.2	8.4	[redacted]	1.1	0.4
Psychology	38,600	0.2	0.0	*	*	*	0.0	0.2	0.2	0.1	[redacted]	0.8
Social Sciences	40,900	1.2	*	0.4	0.1	0.3	0.3	2.2	0.2	0.2	1.8	[redacted]
Nonscience/Nonengineering	17,800	4.5	2.2	4.2	3.7	2.5	3.9	3.9	2.2	2.2	5.0	14.4
No Report	11,700	3.7	1.2	3.6	4.3	3.4	3.5	3.5	2.4	3.1	3.1	3.8

[+]Includes postdoctoral appointees as well as full-time and part-time employed Ph.D.s.
*Less than 0.1 percent.

SOURCE: National Research Council, Science, Engineering and Humanities Doctorates in the United States 1981 Profile.

TABLE 3.3.2

FIELD MOBILITY OF M.S. SCIENTISTS EMPLOYED FULL-TIME AS CHEMISTS

WORK SPECIALTY	FIELD OF HIGHEST DEGREE													
	Chem. Eng.	Bio-chem.	Gen. Chem.	Analy-tical	Inorg-anic	Organic	Polymer	Pharmac-eutical	Theor-etical	Agricul-tural	Physical	Other	Non-Chemical	TOTAL
Biochemistry	3.4%	33.6%	1.6%	0.4%	1.2%	1.5%	0.0%	3.6%	0.0%	5.0%	2.9%	1.6%	3.7%	4.2%
Agricultural	10.3	4.3	0.8	2.9	3.7	3.3	1.9	7.1	0.0	55.0	3.9	1.6	4.9	4.2
Analytical	1.7	18.1	33.3	59.9	24.4	15.2	9.4	25.0	0.0	20.0	21.6	14.1	22.7	25.3
Environmental	8.6	5.2	7.8	12.4	9.8	3.3	0.0	3.6	0.0	10.0	7.8	26.6	13.5	8.2
Organic	5.2	3.4	9.3	2.5	6.1	32.1	0.0	0.0	0.0	0.0	3.9	4.7	8.6	13.0
Inorganic	3.4	0.9	13.2	2.9	32.9	2.2	0.0	7.1	0.0	0.0	2.0	1.6	7.4	5.4
Pharmaceutical	3.4	16.4	7.0	5.8	2.4	15.6	1.9	46.4	0.0	5.0	4.9	1.6	9.2	10.1
Physical	1.7	0.9	3.1	1.2	1.2	0.4	0.0	0.0	0.0	0.0	18.6	3.1	0.0	2.2
Theoretical	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.6	0.2
Polymer	43.1	5.2	10.1	2.9	3.7	12.1	83.0	7.1	0.0	5.0	15.7	15.6	8.6	13.0
Other	19.0	12.1	14.0	8.7	14.6	14.3	3.8	0.0	100.0	0.0	18.6	28.1	20.9	14.2
ALL SPECIALTIES	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE: Example of how to read this table, 46.4% of those who received a M.S. in pharmaceutical chemistry work as pharmaceutical chemists.

SOURCE: ACS, Salaries 1982.

TABLE 3.3.3

FIELD MOBILITY OF PH.D. SCIENTISTS EMPLOYED FULL-TIME AS CHEMISTS

WORK SPECIALTY	FIELD OF HIGHEST DEGREE													
	Chem. Eng.	Bio-chem.	Gen. Chem.	Analy-tical	Inorg-anic	Organic	Polymer	Pharmac-eutical	Theor-etical	Agricul-tural	Physical	Other	Non-Chemical	TOTAL
Biochemistry	0.0%	66.7%	3.6%	0.7%	0.8%	3.2%	0.8%	4.3%	0.0%	11.3%	2.9%	8.2%	28.4%	10.8%
Agricultural	5.0	6.1	0.0	1.2	0.6	3.7	2.5	6.1	0.0	61.3	0.3	2.2	11.0	3.9
Analytical	2.0	4.4	25.0	74.9	11.1	5.7	1.7	12.2	6.5	3.8	11.3	13.4	8.3	13.1
Environmental	8.0	2.8	10.7	5.2	5.4	2.4	2.5	1.7	4.3	13.8	4.4	17.9	14.7	4.4
Organic	10.0	2.1	7.1	1.0	4.8	51.6	2.5	7.0	0.0	2.5	1.0	4.5	2.8	21.3
Inorganic	10.0	0.3	7.1	1.7	52.8	1.3	0.8	0.9	0.0	0.0	5.8	3.0	3.7	7.4
Pharmaceutical	4.0	14.1	0.0	4.7	2.0	10.3	2.5	61.7	4.3	2.5	2.8	6.0	9.2	8.7
Physical	10.0	0.2	17.9	3.7	6.3	0.9	2.5	0.9	28.3	1.3	49.8	4.5	2.8	11.0
Theoretical	0.0	0.2	0.0	0.0	0.4	0.3	0.0	0.0	47.8	0.0	2.3	1.5	1.8	1.1
Polymer	38.0	0.9	14.3	1.7	6.5	15.6	77.5	2.6	6.5	3.8	12.8	3.0	9.2	12.0
Other	12.0	2.3	14.3	5.0	9.3	5.1	6.7	2.6	2.2	0.0	6.5	35.8	8.3	6.3
ALL SPECIALTIES	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE: Example of how to read this table: 66.7% of those who received their doctorate in biochemistry work as biochemists.

SOURCE: ACS, Salaries 1982.

TABLE 3.4.1

EMPLOYMENT OUTLOOK BY FIELD

Field	Employment in 1980	Employment Outlook
Engineers		
Aerospace	68,000	grow faster than the average
Agricultural	15,000	grow faster than the average
Biomedical	4,000	grow faster than the average
Ceramic	15,000	grow faster than the average
Chemical	55,000	grow about as fast as the average
Civil	165,000	grow faster than the average
Electrical	325,000	grow faster than the average
Industrial	115,000	grow faster than the average
Mechanical	213,000	grow faster than the average
Metallurgical	15,000	grow faster than the average
Mining	6,000	grow faster than the average
Petroleum	18,000	grow faster than the average
Environmental scientists		
Geologist	34,000	grow faster than the average
Geophysicists	12,000	grow faster than the average
Meteorologists	4,000	grow more slowly than the average
Oceanographers	2,800	grow about as fast as the average
Life science occupations		
Biochemists	16,000	grow about as fast as the average
Agricultural & biological scientists	125,000	grow about as fast as the average
Mathematics occupations		
Mathematicians	40,000	grow more slowly than the average
Statisticians	26,500	grow about as fast as the average
Physical scientists		
Astronomers	3,000	grow slowly, if at all
Chemists	132,000	grow about as fast as the average
Physicists	37,000	grow more slowly than the average

Source: U.S. Department of Labor, Bureau of Labor Statistics
Occupational Outlook Handbook, 1982-83 edition

TABLE 3.5.1

SCIENTISTS, ENGINEERS, AND PHYSICIANS ADMITTED AS IMMIGRANTS, BY OCCUPATION: 1967 to 1979*

OCCUPATION	1970	1972	1973	1974	1975	1976	1977	1978	1979
Scientists and engineers	13,337	11,323	6,632	5,969	6,931	7,495	7,819	9,225	7,803
Engineers[1]	9,305	7,436	4,443	3,866	4,648	5,146	5,191	6,700	5,886
Chemical	908	791	438	333	438	446	470	481	437
Civil	1,509	1,461	700	575	694	697	543	704	546
Electrical	1,464	1,305	661	543	676	754	680	916	815
Mechanical	1,618	1,470	829	627	845	823	676	811	809
Natural scientists[1]	3,264	3,271	1,790	1,422	1,602	1,663	1,893	1,811	1,331
Agricultural scientists[2]	380	518	388	250	305	212	269	357	183
Biologists, medical scientists	388	527	309	222	238	268	325	256	236
Chemists	1,495	1,372	711	592	675	678	752	824	607
Physicists	401	325	118	113	137	152	148	144	98
Social scientists	768	616	399	681	681	686	735	714	586
Physicians and surgeons	3,155	7,143	7,119	4,537	5,361	6,184	7,073	5,836	4,191

* For years ending June 30 except, beginning 1977, ending Sept. 30.
Includes professors and instructors.
(1) Includes occupations not shown separately.
(2) Includes foresters and conservationists.

SOURCE: U.S. Dept. of Commerce, Bureau of the Census, Statistical Abstract of the United States 1979. Data for 1978 and 1979 is from the Immigration and Naturalization Service, 1979 Statistical Yearbook of the Immigration and Naturalization Service.

TABLE 3.6.1

UNEMPLOYMENT RATES FOR SELECTED GROUPS:
1972 through 1982

	Civilian Labor Force[1]	Professional and Technical[2]	ACS Members[3]
1972	5.6%	2.4	3.1
1973	4.9	2.2	1.8
1974	5.6	2.3	1.4
1975	8.5	3.2	1.6
1976	7.7	3.2	1.9
1977	7.1	3.0	1.5
1978	6.1	2.6	1.4
1979	5.8	2.4	1.1
1980	7.1	2.5	0.9
1981	7.6	2.8	1.0
1982	9.7	3.3	1.5

SOURCES:

1 U.S. Dept. of Labor, Bureau of Labor Statistics, Employment and Earnings, January, 1983.

2 U.S. Dept. of Labor, Bureau of Labor Statistics, BLS Labor Force Dialog File 177.

3 ACS Salaries series.

FIGURE 4.1

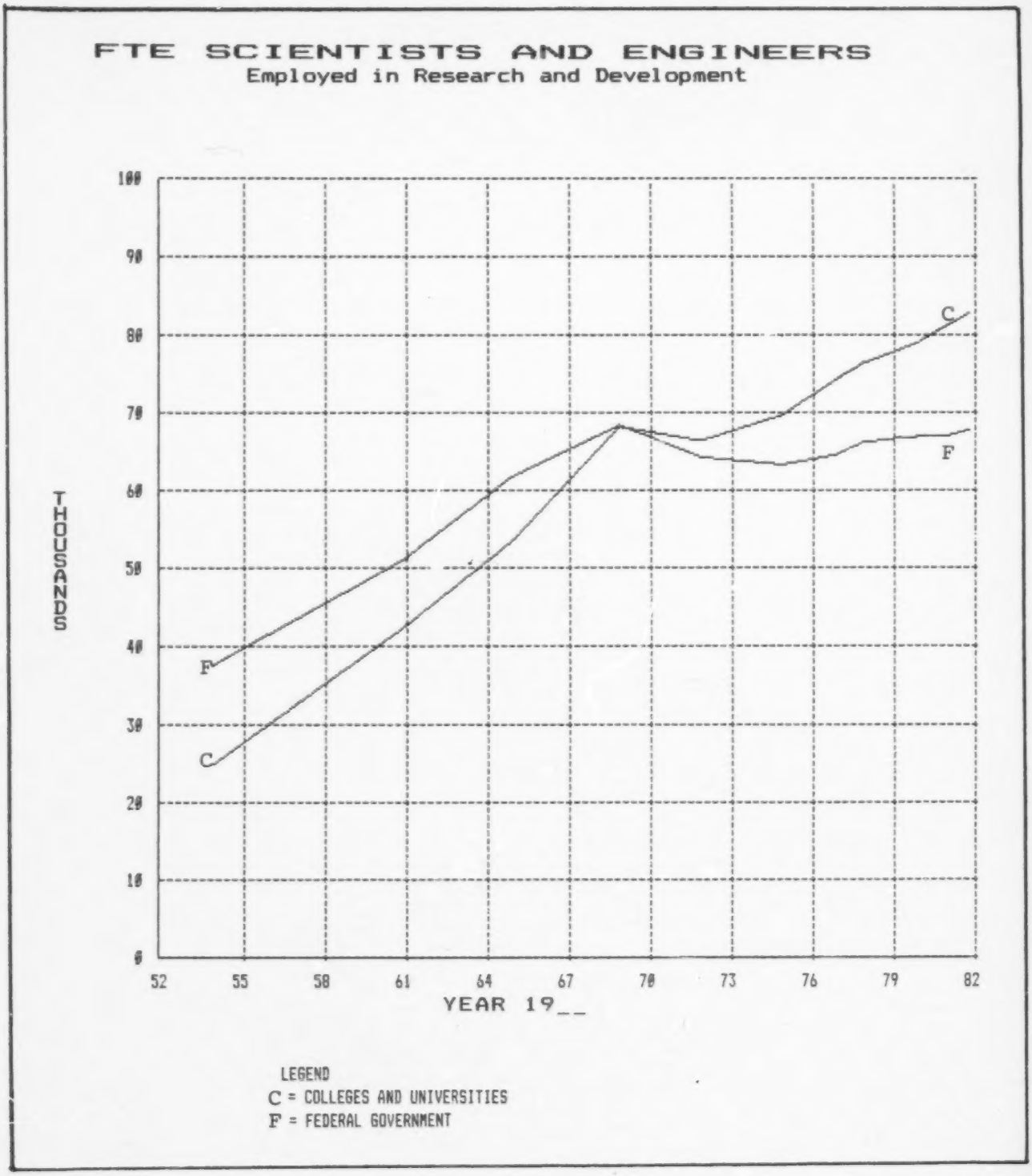

FTE SCIENTISTS AND ENGINEERS
Employed in Research and Development
THOUSANDS
100
90
80
70
60
50
40
30
20
10
0
52
55
58
61
64
67
70
73
76
79
82
YEAR 19__
C
F
LEGEND
C = COLLEGES AND UNIVERSITIES
F = FEDERAL GOVERNMENT

TABLE 4.1.1

SCIENTISTS AND ENGINEERS[1] ENGAGED IN R&D PER 10,000 LABOR FORCE POPULATION BY COUNTRY: 1967-81

Year	France	West Germany	Japan	United Kingdom	United States	U.S.S.R. Low Estimate	U.S.S.R. High Estimate
1967	25.3	24.9	27.8	na	66.1	50.7	55.3
1968	26.4	26.2	31.1	20.8	66.9	53.5	58.8
1969	27.2	28.4	30.8	na	65.9	56.5	62.1
1970	27.3	30.9	33.4	na	63.6	58.4	64.2
1971	27.8	33.8	37.5	na	60.4	63.0	69.1
1972	28.1	36.0	38.1	30.4	57.9	66.5	73.2
1973	28.4	37.8	42.5	na	56.5	73.5	81.5
1974	28.8	39.1	44.9	na	55.8	74.5	82.9
1975	29.3	41.0	47.9	31.3	55.6	78.2	87.5
1976	29.9	41.7	48.4	na	55.6	80.7	90.9
1977	30.0	44.3	49.9	na	56.4	81.3	91.5
1978	31.0	na	49,4	33.2	56.9	82.9	93.3
1979	31.6	na	na	na	57.9	84.2	94.9
1980	na	na	na	na	59.0	na	na
1981	na	na	na	na	60.5	na	na

(1) Includes all scientists and engineers engaged in R&D on a full-time equivalent basis (except Japan whose data include persons primarily employed in R&D and the United Kingdom whose data include only the government and industry sectors).

na = Not available.

SOURCE: National Science Foundation, National Patterns of Science and Technology Resources 1982, (NSF 822-319).

TABLE 4.1.2

R&D SCIENTISTS AND ENGINEERS PER 1,000 EMPLOYEES BY INDUSTRY: 1958, 1963, AND 1966-80

INDUSTRY	YEAR																
	1958	1963	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
All Products	21	28	27	27	26	26	26	26	24	24	25	26	27	27	28	28	29
Food and kindred products	6	7	7	7	8	7	7	7	7	7	7	7	7	7	8	8	8
Textiles and apparel	1	3	3	3	4	4	4	3	3	3	3	3	3	3	3	3	3
Lumber, wood products, and furniture	5	4	4	4	4	5	6	7	6	7	7	7	7	7	7	7	7
Paper and allied products	6	6	6	6	6	6	8	8	8	8	8	10	12	12	14	14	15
Chemicals and allied products	39	40	38	36	35	35	39	41	39	39	40	41	40	42	42	40	41
Industrial chemicals	42	40	35	33	32	32	35	35	34	36	37	38	36	38	38	36	36
Drugs and medicines	46	47	53	51	48	48	65	65	60	57	57	59	64	62	64	61	61
Other chemicals	30	38	35	33	30	31	30	31	31	29	30	29	28	28	26	27	29
Petroleum refining and extraction	15	17	17	18	15	16	17	17	16	17	18	19	17	18	20	20	21
Rubber products	19	20	17	17	17	17	17	15	16	17	17	18	18	19	18	(1)	(1)

SOURCE: National Science Foundation, Research and Development in Industry, 1980, (NSF 882-317).

TABLE 4.1.3

FULL-TIME-EQUIVALENT NUMBER OF R&D SCIENTISTS AND ENGINEERS BY INDUSTRY: 1957,1963,1968 and 1973-1981
(in thousands)

	YEAR											
INDUSTRY	1957	1963	1968	1973	1974	1975	1976	1977	1978	1979	1980	1981
All Products	229.4	327.3	376.7	357.7	360.0	363.3	364.4	382.8	403.7	423.2	446.6	470.2
Food & kindred products	3.8	5.1	6.3	6.6	6.4	6.8	6.9	6.9	6.9	7.4	7.2	7.4
Textiles & apparel	0.7	1.0	2.5	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.8	1.7
Lumber, wood products, and furniture	0.8	0.5	0.5	1.9	2.1	2.3	2.1	2.1	2.2	2.2	2.2	2.3
Paper & allied products	1.5	2.5	4.8	4.9	4.9	5.0	5.2	6.3	6.6	7.2	7.5	8.2
Chemical & allied products	29.4	38.3	38.9	40.9	41.8	45.2	44.4	46.4	47.9	49.1	50.0	52.8
Industrial chemicals	13.0	22.9	22.3	19.1	19.1	21.1	20.1	20.6	21.5	21.6	21.3	22.1
Drugs & medicines	4.7	6.9	9.8	13.0	14.0	15.6	16.6	17.8	18.9	19.7	20.0	21.1
Other chemicals	6.7	8.5	6.8	8.8	8.7	8.5	7.8	8.0	7.4	7.8	8.7	9.6
Petroleum refining and related industries	6.9	8.9	9.2	8.2	8.2	8.4	8.6	8.9	10.0	10.3	11.0	13.4
Rubber products	4.7	5.8	6.1	7.5	7.7	8.4	8.6	9.1	7.9	8.1	(1)	(1)

(1) Not separately available but included in total.

SOURCE: National Science Foundation, Research and Development in Industry, 1980, (NSF 82-317).

TABLE 4.1.4

FULL-TIME EQUIVALENT (FTE) SCIENTISTS AND ENGINEERS EMPLOYED IN RESEARCH AND DEVELOPMENT BY SECTOR: SELECTED YEARS[1]

[in thousands]

Sector	1954	1961	1965	1969	1972	1975	1977	1978	1979	1980[1]	1981[2]	1982[2]
Total	237.1	425.7	494.5	555.2	518.3	532.7	570.4	595.3	621.0	647.2	673.0	698.0
Federal Government[3]	37.7	51.1	61.8	68.5	63.4	63.4	64.7	66.3	66.7	67.0	67.0	68.0
Industry[4,5]	164.1	312.0	348.4	385.6	363.8	363.8	393.2	413.4	434.9	458.4	482.0	505.0
Universities and colleges, total	25.0	42.4	53.4	68.3	66.5	69.8	74.4	76.5	77.8	79.1	81.1	83.0
Scientists and engineers	20.3	33.6	40.4	50.4	48.9	51.2	54.4	55.9	56.1	56.4	57.2	58.1
Graduate students[6]	4.7	8.8	13.0	17.9	17.6	18.6	20.0	20.6	21.7	22.7	23.9	24.9
University-associated FFRDC's, total	5.0	9.1	11.1	11.6	11.7	12.7	14.0	14.1	14.1	15.2	15.4	15.9
Scientists and engineers	4.9	8.8	10.7	11.1	11.3	12.3	13.6	13.7	13.7	14.8	15.0	15.5
Graduate students	.1	.3	.4	.5	.4	.4	.4	.4	.4	.4	.4	.4
Other nonprofit institutions[4]	5.3	11.1	19.9	21.2	21.8	23.0	24.0	25.0	27.5	27.5	27.5	26.1

1 Number of full-time employees plus the FTE of part-time employees. Excludes scientists and engineers employed in State and local government agencies. Totals may be understated by about 5 percent because of incomplete data on summer employment at universities and colleges.

2 Estimate.

3 Includes both civilian and military service personnel and managers of R&D.

4 Includes professional R&D personnel employed at FFRDC's administered by organizations in the sector.

5 Excludes social scientists.

6 Numbers of FTE graduate students receiving stipends and engaged in R&D.

NOTE: The figures for the industry sector represent yearly averages and may differ from other data in the text which is based upon surveys reporting the employment in a single month of the year.

SOURCE: National Science Foundation, National Patterns of Technology Resources 1982, (NSF 82-319).

TABLE 4.2.1

Annual cost per R&D scientist or Engineer By INDUSTRY and By SIZE OF COMPANY: 1957, 1963, 1968, and 1973-80

INDUSTRY AND SIZE OF COMPANY		YEAR 1957	1963	1968	1973	1974	1975	1976	1977	1978	1979	1980
All Products		$32,700	$37,800	$45,600	$59,200	$63,300	$66,500	$72,200	$76,100	$ 80,700	$ 87,700	$ 95,700
Distribution by Industry:												
Food and kindred products		17,200	25,200	29,200	41,400	45,200	48,900	51,400	57,200	60,000	62,900	70,800
textiles and apparel		20,000	26,400	22,700	34,900	38,300	38,900	46,900	46,300	49,400	53,100	58,300
Lumber, wood products, and furniture		17,500	22,000	25,000	35,500	38,200	40,000	51,000	59,100	60,500	68,600	73,300
Paper and allied products		21,900	27,000	30,000	38,900	47,900	48,800	54,400	56,900	56,700	61,800	64,700
Chemicals and allied products		23,300	32,600	40,200	51,100	56,300	60,900	66,500	69,100	73,900	81,400	89,600
Industrial chemicals		27,400	34,800	43,700	58,600	63,500	67,500	74,700	80,000	85,200	94,300	104,700
Drugs and medicines		21,200	30,200	39,800	51,500	54,300	60,900	63,400	65,000	65,800	72,800	81,000
Other chemicals		14,200	27,900	30,500	34,000	45,300	43,200	50,800	54,200	63,000	68,500	73,200
Petroleum refining and related industries		29,500	35,400	45,500	60,400	74,900	81,500	87,200	97,100	104,400	119,700	128,300
Rubber products		22,800	26,500	34,800	56,100	58,300	54,900	56,700	57,800	61,000	(1)	(1)
Distribution by Size of Company: (based on number of employees)												
Less than 1,000		11,600	18,600	26,500	32,900	36,400	40,500	45,200	43,200	47,800	54,800	58,600
1,000 to 4,999	(2)	27,200	29,400	35,500	43,200	46,700	46,800	51,600	55,900	64,900	70,400	69,100
5,000 to 9,999				39,000	43,700	50,000	55,300	60,300	61,700	46,300	46,100	54,200
10,000 to 24,999	(2)	39,400	41,400		49,100	51,800	53,700	57,500	66,900	78,500	84,200	87,000
25,000 or more				49,100	68,700	72,700	76,600	82,700	85,800	90,400	99,600	111,300

(1) Not separately available but included in total.
(2) Estimated by the National Science Foundation.

SOURCE: National Science Foundation, Research and Development in Industry, 1980, (NSF 82-317).

TABLE 4.2.2

ANNUAL COST PER R&D SCIENTIST OR ENGINEER by INDUSTRY AND SELECTED COMPANY SIZE GROUP: 1980

INDUSTRY	COMPANY WITH TOTAL EMPLOYMENT			
	Total	5,000-9,999	10,000-24,999	25,000 or more
All Products	$95,722	$54,217	$87,030	$111,310
Food and kindred products	70,822	67,539	67,909	74,057
Textiles and apparel	58,286	72,985	58,913	50,933
Lumber, wood products and furniture	73,333	85,500	(1)	(1)
Paper and allied products	64,713	(1)	74,921	(1)
Chemicals and allied products	89,650	54,168	89,110	100,042
Industrial chemicals	104,747	79,856	110,018	105,930
Drugs and medicines	81,022	33,845	88,160	73,608
Other chemicals	73,224	77,025	68,859	(1)
Petroleum refining and extraction	128,279	(1)	120,339	134,158
Rubber products	(1)	63,119	(1)	70,300

(1) Not separately available but included in total.

Source: National Science Foundation, Research and Development in Industry, 1980, (NSF 82-317).

TABLE 4.3.1

NATIONAL EXPENDITURES FOR PERFORMANCE OF R&D AS A PERCENT OF GROSS NATIONAL PRODUCT (GNP) BY COUNTRY: 1967-81

Year	France	West Germany	Japan	United Kingdom	United States	U.S.S.R.
1967	2.13	1.97	1.52	2.29	2.89	2.91
1968	2.08	1.97	1.60	2.25	2.82	na
1969	1.94	2.05	1.64	2.22	2.72	3.03
1970	1.91	2.18	1.81	na	2.63	3.23
1971	1.90	2.38	1.85	na	2.48	3.29
1972	1.86	2.33	1.86	2.05	2.40	3.58
1973	1.76	2.22	1.90	na	2.32	3.66
1974	1.79	2.26	1.97	na	2.29	3.64
1975	1.80	2.38	1.96	2.05	2.27	3.69
1976	1.77	2.29	1.95	na	2.27	3.55
1977	1.76	2.31	1.93	na	2.24	3.46
1978	1.76	2.31	1.96	2.13	2.24	3.47
1979	1.81	2.34	1.97	na	2.28	3.44
1980	1.84	2.32	na	na	2.37	3.47
1981	na	na	na	na	2.39	na

na = Not Available

SOURCE: National Science Foundation, National Patterns of Science and Technology Resources 1982, (NSF 82-319).

TABLE 4.3.2

Sources of funds for research and development by sector: 1953, 1960, and 1965-82

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	5,124	2,753	2,245	72	54
1960[1]	13,523	8,738	4,516	149	120
1965[2]	20,044	13,012	6,548	267	217
1966	21,846	13,968	7,328	304	246
1967	23,146	14,395	8,142	345	264
1968	24,605	14,928	9,005	390	282
1969	25,631	14,895	10,010	420	306
1970	26,134	14,892	10,444	461	337
1971	26,676	14,964	10,822	529	361
1972	28,477	15,808	11,710	574	385
1973	30,718	16,399	13,293	613	413
1974	32,864	16,850	14,678	677	459
1975	35,213	18,109	15,820	749	535
1976	39,016	19,914	17,694	808	600
1977	42,982	21,727	19,696	887	672
1978	48,295	24,003	22,491	1,035	766
1979	54,994	26,935	26,028	1,194	837
1980 (prelim.)	62,222	29,576	30,400	1,313	933
1981 (est.)	69,790	32,910	34,385	1,490	1,005
1982 (est.)	77,285	36,125	38,500	1,600	1,060

Constant dollars[3]

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	8,677	4,649	3,816	121	91
1960[1]	19,835	12,673	6,573	214	175
1965[2]	26,896	17,443	8,808	356	291
1966	28,442	18,180	9,547	395	320
1967	29,241	18,176	10,299	434	332
1968	29,833	18,108	10,910	474	341
1969	29,586	17,209	11,536	488	353
1970	28,813	16,316	11,421	506	370
1971	27,814	15,615	11,271	553	375
1972	28,477	15,808	11,710	574	385
1973	29,163	15,602	12,579	588	394
1974	28,800	14,843	12,947	605	405
1975	28,204	14,561	12,603	608	432
1976	29,559	15,096	13,393	613	455
1977	30,695	15,500	14,065	631	479
1978	32,192	16,002	14,989	690	511
1979	33,782	16,545	15,990	733	514
1980 (prelim.)	35,114	16,705	17,139	743	527
1981 (est.)	36,052	17,004	17,760	770	518
1981 (est.)	36,974	17,276	18,428	764	506

[1]Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-1977* (NSF 77-311).
[2]Data for 1961-64 can be found in *National Patterns of Science and Technology Resources, 1981* (NSF 81-311).
[3]Based on GNP implicit price deflator.

TABLE 4.3.3

Research and development performance by sector: 1953, 1960, and 1965-82

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	5,124	1,010	3,830	255	121	108
1960[1]	13,523	1,726	10,509	646	360	282
1965[2]	20,044	3,093	14,185	1,474	629	663
1966	21,846	3,220	15,548	1,715	630	733
1967	23,146	3,398	16,385	1,921	673	771
1968	24,605	3,494	17,429	2,149	719	814
1969	25,631	3,503	18,308	2,225	725	870
1970	26,134	4,079	18,067	2,335	737	916
1971	26,676	4,228	18,320	2,500	716	912
1972	28,477	4,590	19,552	2,630	753	952
1973	30,718	4,762	21,249	2,884	817	1,006
1974	32,864	4,911	22,887	3,023	865	1,178
1975	35,213	5,354	24,187	3,409	987	1,276
1976	39,016	5,769	26,997	3,727	1,147	1,376
1977	42,982	6,105	29,928	4,070	1,384	1,495
1978	48,295	6,920	33,365	4,621	1,717	1,672
1979	54,994	7,564	38,147	5,354	1,935	1,994
1980 (prelim.)	62,222	7,929	44,879	6,049	2,236	2,130
1981 (est.)	69,790	9,000	49,600	6,600	2,350	2,240
1982 (est.)	77,285	10,000	55,700	6,950	2,350	2,285

Constant dollars[3]

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	8,677	1,692	6,161	428	203	183
1960[1]	19,835	2,481	15,297	928	517	412
1965[2]	26,896	4,124	19,077	1,965	838	892
1966	28,442	4,183	20,256	2,229	819	955
1967	29,241	4,276	20,725	2,417	840	975
1968	29,833	4,246	21,116	2,612	874	985
1969	29,586	4,065	21,094	2,582	842	1,003
1970	28,813	4,481	19,756	2,564	809	1,003
1971	27,814	4,422	19,081	2,613	749	949
1972	28,477	4,590	19,552	2,630	753	952
1973	29,163	4,561	20,106	2,763	782	951
1974	28,800	4,387	19,915	2,700	773	1,025
1975	28,204	4,350	19,263	2,771	802	1,018
1976	29,559	4,381	20,435	2,831	871	1,041
1977	30,695	4,343	21,403	2,895	985	1,069
1978	32,192	4,615	22,237	3,081	1,145	1,114
1979	33,782	4,648	23,435	3,287	1,188	1,226
1980 (prelim.)	35,114	4,486	24,740	3,423	1,265	1,200
1981 (est.)	36,052	4,652	25,619	3,411	1,215	1,155
1982 (est.)	36,974	4,778	26,663	3,319	1,122	1,092

[1]Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-1977* (NSF 77-310).
[2]Data for 1961-64 can be found in *National Patterns of Science and Technology Resources, 1981* (NSF 81-311).
[3]Based on GNP implicit price deflator.

SOURCE: National Science Foundation, National Patterns of Science and Technology Resources 1982, (NSF 82-319)

TABLE 4.3.4 R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES, BY SOURCE OF FUNDS, CHARACTER OF WORK, AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1970 AND 1972-80

(DOLLARS IN THOUSANDS)

SOURCE, CHARACTER, AND FIELD	1970	1972	1973	1974	1975	1976	1977	1978 1/	1979	1980
TOTAL	2,334,859	2,630,442	2,883,958	3,022,642	3,408,616	3,727,232	4,069,847	4,521,291	5,354,438	6,049,325
SOURCE OF FUNDS:										
FEDERAL GOVERNMENT	1,647,500	1,795,045	1,985,386	2,032,204	2,288,070	2,511,603	2,729,755	3,057,159	3,594,386	4,092,569
STATE AND LOCAL GOVERNMENTS	219,777	269,582	294,572	306,881	331,612	363,017	373,213	413,588	468,976	492,310
INDUSTRY	60,538	74,413	83,968	95,953	112,952	123,134	138,788	169,635	192,745	235,511
INSTITUTIONAL FUNDS	293,051	304,789	318,289	369,689	417,391	444,972	513,559	521,871	725,063	820,940
ALL OTHER SOURCES	164,993	186,613	201,743	217,915	258,591	284,506	314,532	359,069	373,268	407,995
CHARACTER OF WORK: 2/										
BASIC RESEARCH	1,795,864	2,022,150	2,053,140	2,153,952	2,409,443	2,547,578	2,801,762	-	3,607,310	4,318,809
APPLIED RESEARCH AND DEVELOPMENT	538,995	608,292	830,818	868,690	999,173	1,179,656	1,268,085	-	1,747,128	2,330,515
FIELD:										
ENGINEERING 3/	319,836	341,362	339,129	346,905	380,912	431,727	498,473	601,052	767,799	862,600
AERONAUTICAL AND ASTRONAUTICAL	-	-	-	-	-	-	-	-	-	48,789
CHEMICAL	-	-	-	-	-	-	-	-	-	64,474
CIVIL	-	-	-	-	-	-	-	-	-	86,602
ELECTRICAL	-	-	-	-	-	-	-	-	-	173,937
MECHANICAL	-	-	-	-	-	-	-	-	-	144,705
OTHER, N.E.C.	-	-	-	-	-	-	-	-	-	339,093
PHYSICAL SCIENCES	307,310	324,222	328,262	333,479	350,275	379,376	428,406	496,399	603,290	679,655
ASTRONOMY	18,597	21,596	24,114	24,427	26,607	26,294	32,361	36,782	39,060	52,309
CHEMISTRY	102,002	108,122	113,687	115,777	120,707	140,139	164,302	183,131	207,574	245,513
PHYSICS	161,921	159,067	167,013	169,250	173,510	183,050	201,655	235,099	300,798	329,151
OTHER, N.E.C.	24,790	35,437	23,448	24,025	29,451	29,993	30,088	41,387	55,758	52,858
ENVIRONMENTAL SCIENCES 3/	125,315	189,021	209,385	235,072	295,060	286,972	317,507	377,548	450,669	506,064
ATMOSPHERIC	-	-	-	-	-	-	-	-	-	83,077
EARTH SCIENCES	-	-	-	-	-	-	-	-	-	196,550
OCEANOGRAPHY	-	-	-	-	-	-	-	-	-	139,175
OTHER, N.E.C.	-	-	-	-	-	-	-	-	-	87,232
MATHEMATICAL/COMPUTER SCIENCES	72,413	69,322	72,741	76,709	85,306	86,994	107,868	126,178	176,012	191,940
MATHEMATICS 4/	-	-	37,084	37,507	39,713	42,491	52,305	58,756	78,424	78,408
COMPUTER SCIENCES 4/	-	-	35,657	39,202	45,593	44,503	55,563	67,422	97,588	113,532
LIFE SCIENCES	1,194,249	1,329,320	1,529,608	1,631,778	1,900,834	2,101,688	2,258,803	2,535,455	2,828,282	3,210,597
AGRICULTURAL SCIENCES 5/	-	227,079	276,870	347,514	383,841	412,867	460,647	497,562	576,436	648,591
BIOLOGICAL SCIENCES	347,193	443,473	556,676	510,210	630,163	710,717	772,287	855,882	965,876	1,082,578
MEDICAL SCIENCES	549,121	594,574	645,709	716,080	811,383	897,376	950,907	1,093,499	1,201,052	1,379,172
OTHER, N.E.C.	97,935	64,194	50,353	57,974	75,447	80,728	74,962	88,422	84,918	100,346
PSYCHOLOGY	59,250	69,188	73,742	74,236	80,322	77,883	85,129	89,664	100,389	111,019
SOCIAL SCIENCES	168,669	202,792	231,115	240,617	256,083	262,238	268,032	277,497	294,622	341,450
ECONOMICS	35,616	45,784	47,628	47,685	55,928	65,439	72,089	79,129	86,515	94,417
POLITICAL SCIENCE	19,273	21,396	25,504	27,017	29,381	28,352	32,314	36,571	40,066	49,161
SOCIOLOGY	44,383	58,451	61,514	63,447	68,749	66,239	61,922	66,900	73,529	88,361
OTHER, N.E.C.	66,397	77,161	96,469	102,468	102,025	102,208	101,707	94,897	94,512	109,511
OTHER SCIENCES, N.E.C.	88,817	105,215	105,776	83,846	99,824	100,454	105,629	115,478	133,375	145,907

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
2/ DATA WERE NOT COLLECTED IN 1979.
3/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.
4/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.
5/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES; ESTIMATED FOR 1972 AND 1973 BASED ON DATA COLLECTED IN 1974.

SOURCE: National Science Foundation, Academic Science R&D Funds Fiscal Year 1980, (NSF 82-300).

TABLE 4.3.5

R&D FUNDS AS PERCENT OF NET SALES IN R&D-PERFORMING MANUFACTURING COMPANIES
BY INDUSTRY AND SIZE OF COMPANY: 1957, 1963, 1968 and 1973-1980

INDUSTRY	YEAR 1957	1963	1968	1973	1974	1975	1976	1977	1978	1979	1980
All Products	3.4	4.5	4.0	3.3	3.1	3.1	3.1	3.1	3.2	3.0	3.1
Food & kindred products	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Textiles & apparel	(1)	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Lumber, wood products & furniture	(1)	0.5	0.4	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.8
Paper & allied products	0.6	0.8	0.9	0.7	0.8	0.9	1.0	0.9	1.0	1.0	1.1
Chemicals & allied products	3.5	4.3	3.8	3.5	3.5	3.7	3.7	3.7	3.6	3.4	3.5
Industrial chemicals	5.0	5.1	4.0	3.6	3.3	3.6	3.7	3.5	3.5	3.2	3.3
Drugs & medicines	3.6	4.7	6.0	6.5	6.3	6.4	6.3	6.4	6.3	6.1	6.2
Other chemicals	1.3	2.8	2.1	1.6	1.6	1.7	1.7	1.8	1.8	1.8	2.0
Petroleum refining & related industries	0.7	1.0	0.8	0.7	0.6	0.7	0.6	0.7	0.8	0.7	0.6
Rubber products	1.7	2.3	2.1	2.6	2.5	2.5	2.4	2.4	1.9	1.9	2.2

(1) Not separately available but included in total.

SOURCE: National Science Foundation, Research and Development in Industry, 1980, (NSF 82-317).

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ERRATA

On page 25, column headings "22-year-olds (million)" should read "chemistry degrees", and "chemistry degrees" should read "22-year-olds (thousands)".

On pages 26 and 27, the number of 24-year-olds and 30-year-olds are reported in thousands, not in millions.